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TECHNOLOGY DEPT.

Telephone ENGINEER and MANAGEMENT

SEPTEMBER, 1945

Featuring

FALL CONSTRUCTION PRACTICES as well as many POSTWAR plant suggestions

THE COVER PICTURE—

Working on crossarms of dead-end pole over a river crossing in Iwate. Crossarms are of angle iron because of the enormous strain. One strand of 2000 ft. across the river exerts a strain of one ton and 32 lines make the total strain 32 tons.] Signal Corps photo.

VOLUME 49, NUMBER 9. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication, Pontiac, Illinois. Executive and Editorial Office, 7730 Sheridan Road, Chicago, Illinois. Subscriptions: U. S., Cuba, Mexico, $1.50 per year; Canada $2.00, in all other countries, $3.50. Single copies, U.S.A. 15 cents; elsewhere JANUARY 15 ELBE BOOK BUYER'S GUIDE $1.00. Entered as second class matter at the post office at Pontiac, Illinois, under the act of March 3, 1879.

THE MAGAZINE OF THE TELEPHONE INDUSTRY

LEICH EQUIPMENT IS A "SELF-MADE" SUCCESS

Thirty-five years ago Leich's manufacture consisted chiefly of a few types of magneto telephones—and these were for telephone companies in the area immediately surrounding the Leich factory. Today, Leich builds a complete line of telephones and switchboards that are employed by operating administrations throughout the world.

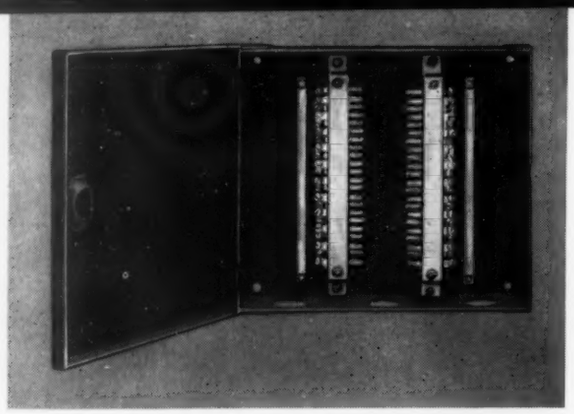
The reason for Leich's consistent growth and expansion is simple. It lies in the day-to-day performance of Leich equipment. Each Leich telephone and each Leich switchboard is constructed to do its job so well that the acceptance of future Leich equipment is assured.

Specifications, prices and deliveries on all Leich equipment may be obtained by writing Leich Sales Corporation, 427 W. Randolph Street, Chicago, Illinois.

LEICH

MANUFACTURERS OF TELEPHONES, SWITCHBOARDS

AND RELATED APPARATUS SINCE 1907



A Practical, Efficient Way of terminating and distributing lead covered cable is to use the Reliable Building Terminal Box. Made by RELIABLE ELECTRIC COMPANY, it's available in capacities from 11 to 104 pairs, with a choice of three different types of terminal strips.

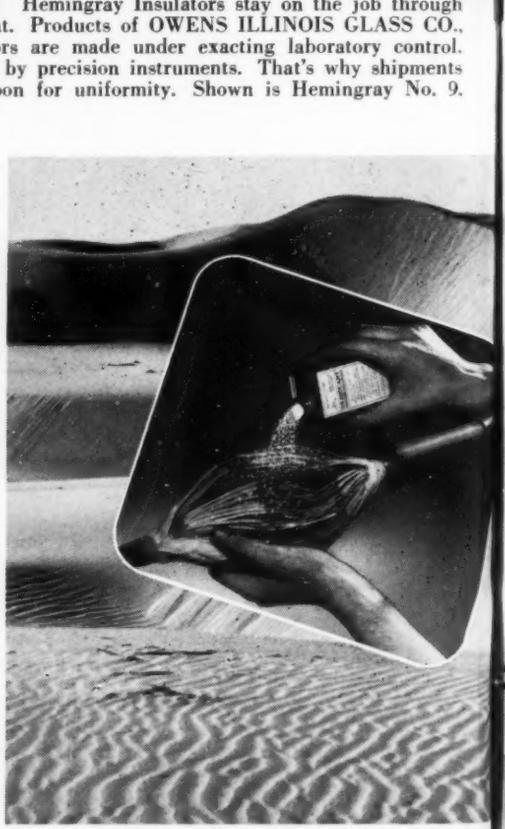
Doubles Battery Room Capacity! In capacity, dimensions, and engineering features, PHILCO Vitrabloc gives telephone engineers all the advantages of the rubber-jar cell, in many cases *doubling* the ampere hour capacity of battery rooms designed for glass jars. Always specify Vitra bloc!

On Guard—in Any Weather! Hemingray Insulators stay on the job through rain, snow, and summer heat. Products of OWENS ILLINOIS GLASS CO., these *weather-proof* insulators are made under exacting laboratory control. Every lot is checked hourly by precision instruments. That's why shipments can always be depended upon for uniformity. Shown is Hemingray No. 9.

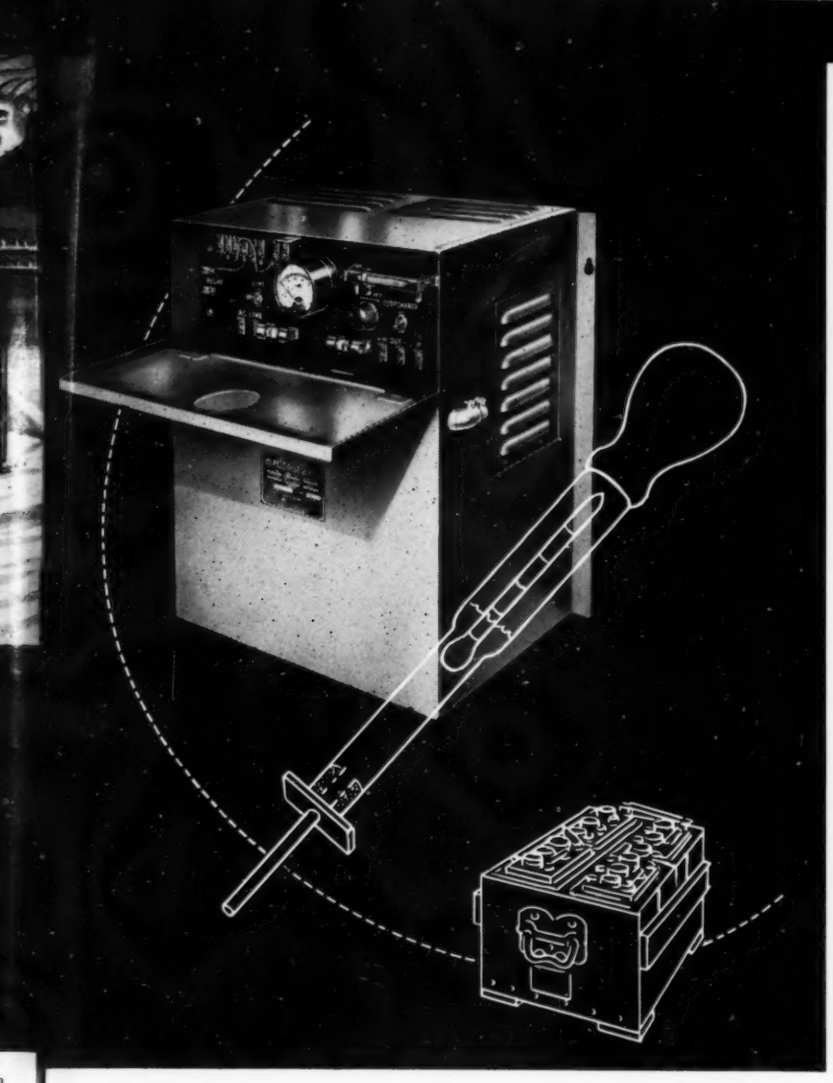
Never
pectan
keeps
caused
offers

ock-Absorbing "Spot-Light"! Flexibal is a nsible guy guard. Made of short sections of od, it absorbs impacts, prevents damage to elf or the striking object. Aluminum coated, s highly visible both day or night. Installa- n of this S. E. OVERTON product is simple.

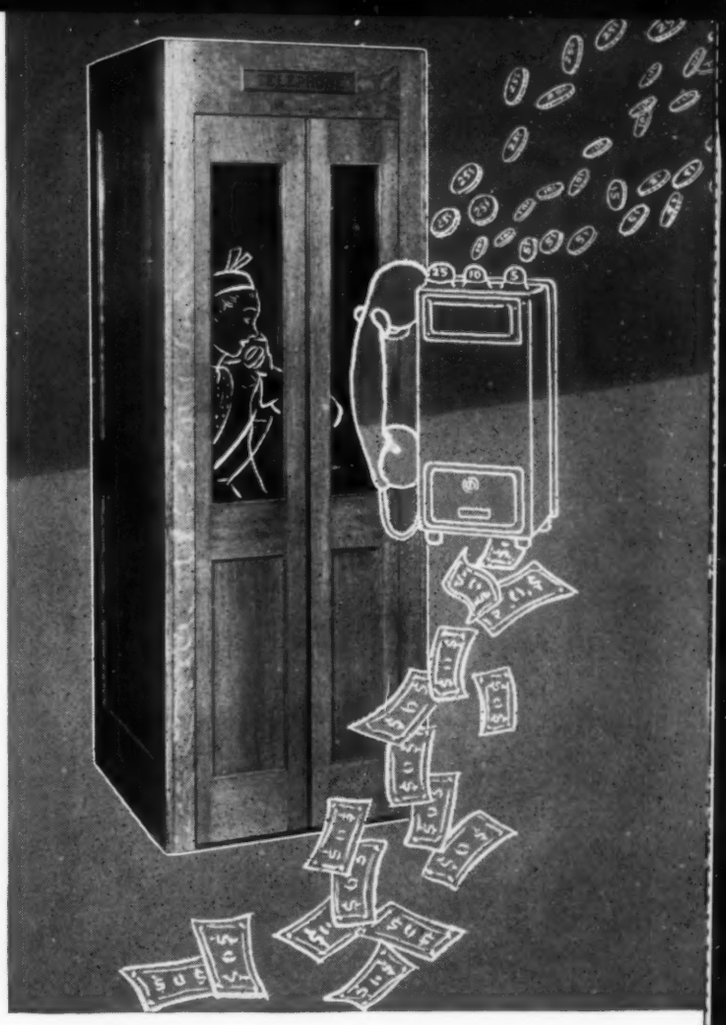
Fits Telephone Needs to a "T". Because Ray-O-Vac Telephone Dry Batteries are built to resist deterioration when not in use, they're especially serviceable for telephone work. Their internal protective coating, developed by RAY-O-VAC CO., extends their useful life, whether used or not. The result is lower costs.



Drier Than the Driest Desert! The easy way to dry splices in lead covered cables is to sprinkle Drierite Desiccant among the conductors. It makes the splice about the driest part of the cable. This W. A. HAMMOND DRIERITE COMPANY product won't harm either conductors or insulation.



Never Over, Never Under. Storage Batteries reach their maximum life expectancy when you use the RectiChargeR automatic method of charging. It keeps batteries fully charged at all times and puts an end to operating trouble caused by under- or over-charging. RAYTHEON MANUFACTURING CO. offers this sure method to keep storage batteries constantly "healthy".



Throughout the Country it has been proved over and over again that pay tion revenues increase when the public is given the privacy of teleph booths. Churchill Booths particularly have the roominess, comfort and priv which attract business. A popular example is CHURCHILL CABIN COMPANY'S No. 100 Booth, with automatic light switch and ventilator.

KELLOGG Recommends and Guarantees These Finer Supplies

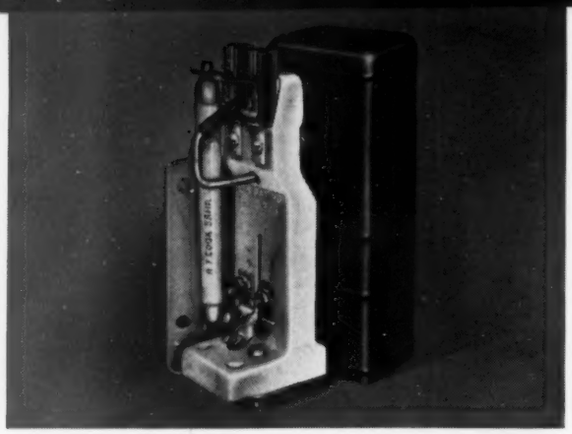
. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

KELLOGG SWITCHBOARD & SUPPLY COMPANY

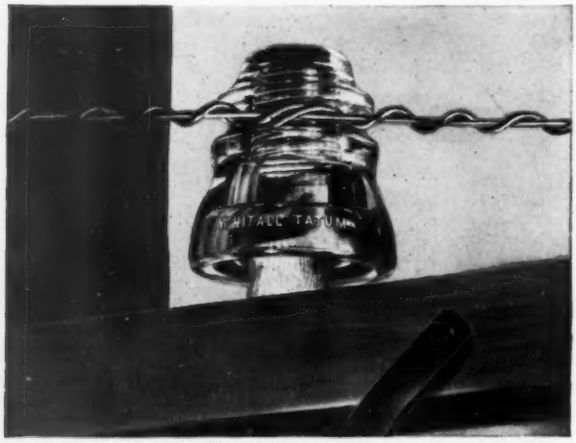
Factory and General Offices: 6650 South Cicero Avenue, Chicago 38, Illinois

Branch Offices: Kansas City San Francisco St. Paul Los Angeles

Order Your Line Supplies from KELLOGG



Built to "Take It!" The Cook Type "O" Sub-Station Protector, with one pair of fuses and one pair of high potential dischargers, is ideal for both indoor and outdoor use. Made by COOK ELECTRIC COMPANY, its body is made of low absorbent porcelain, designed to prevent surface leakage.

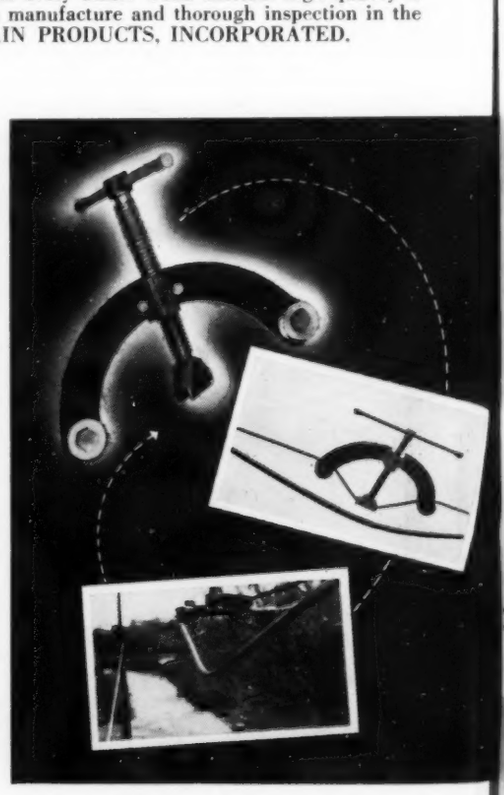


Meet Every Service Need. That's why so many telephone companies use Armstrong's Whitall Tatum Insulators. Made by ARMSTRONG CORK COMPANY, they feature crystal clarity of glass, accurate gaging, and unusual resistance to temperature changes. A good bet for reducing maintenance.

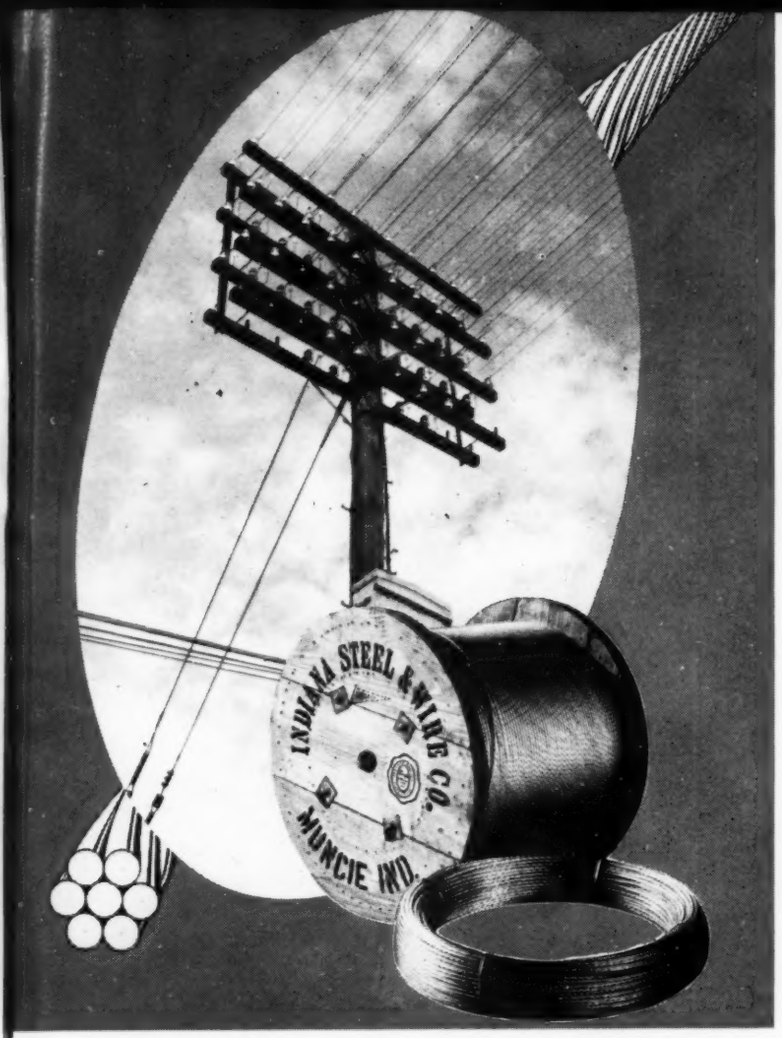
Unvarying Uniformity: that's the one outstanding characteristic of all Porcelain Knobs and Screw Eyes. You can go through a million of them and find that every one is the exact duplicate of every other. Such uniform high quality is the result of their high precision manufacture and thorough inspection in the laboratory. Made by PORCELAIN PRODUCTS, INCORPORATED.

The Right Tool for Every Job. That's the formula for better work, with VULCAN ELECTRIC COMPANY'S quality products. Typical are the Electric Pouring Ladle (used with waxes and compounds as well as solder), the Special Wax Melting Pot, and the "1700 Series" Solder Melting Pot.

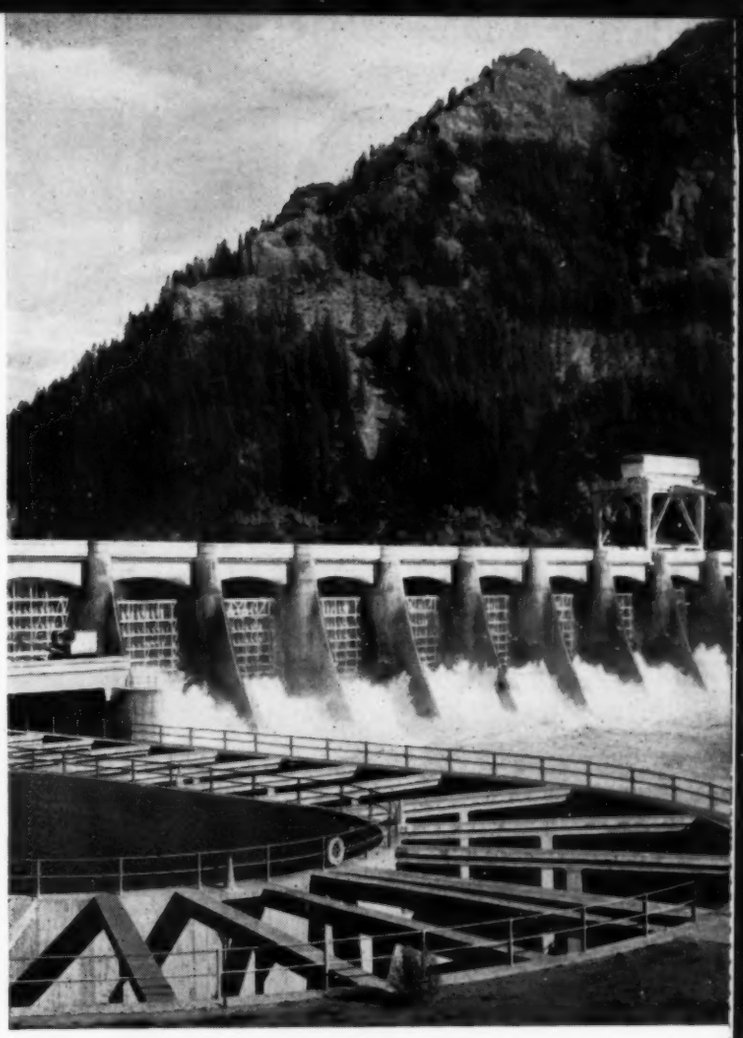
Your Operator's Transmitter can only be as efficient as its source of power. NATIONAL CARBON COMPANY'S "Eveready" "Air Cells" supply 6,000 talking hours of constant voltage and sustained high quality transmission. Insure clear distinct transmission with these cells. They are available in voltages of 2.5 and 1.25.



Time and Labor Saver. CABLE SPINNING EQUIPMENT CO'S. "Little Giant" Slack Puller is ideal for taking up and holding slack in spun messenger strand and cable before making cable repairs. A valuable time-saver, it cuts insulation damage caused by working on tight cables.



The Time-Tested Steel Strand. Lasting protection against corrosion is provided in Indiana Crapo Steel Strand, thanks to its heavy ductile, tightly-adherent coating of zinc, applied by the famous Crapo Galvanizing Process. This, plus rugged strength, are your assurance of long life and low maintenance with this product, made by INDIANA STEEL & WIRE COMPANY.



Bonneville Dam. At the Bonneville hydro-electric plant on the Columbia River, the bus bars, carrying from 125,000 volts of power, are made of wrought iron. 35 years ago, PARAGON ELECTRIC CO. introduced iron conductors in Ironite Drop Wire because of its strength, conductivity, and workability. Today they make Ironite a drop wire of unexcelled performance.

KELLOGG Recommends and Guarantees These Finer Supplies

. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

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Order Your Line Supplies from KELLOGG

ROEBLING

NOTE-WORTHY...

For Superior Wire Value

Make a note of what you get—with these 5 stand-out Roebling telephone wires and cables: Dependability on difficult assignments . . . service that lasts . . . elimination of frequent replacements . . . saving of expensive, trouble-shooting man-hours . . . reduced maintenance costs.

It all adds up to superior wire value—to help you keep busy phone circuits trouble-free today . . . and profitable tomorrow!

With the skill acquired in a century's wire specialization, Roebling performs every operation in its modern mills—from hot-rolling copper bars to testing finished cable — to assure you the finest in wire products.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING

PACEMAKER IN WIRE PRODUCTS

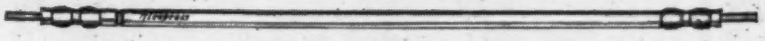
WIRE ROPE AND STRAND • FITTINGS • SLINGS
COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • SUSPENSION BRIDGES AND CABLES • WIRE CLOTH AND NETTING • ELECTRICAL WIRES AND CABLES • AERIAL WIRE ROPE SYSTEMS AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

"JOB PROVEN"
by Linemen the World over

Nicopress splices on twisted pair.

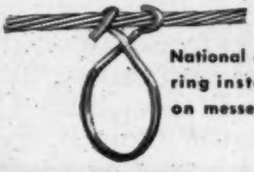
Completed Offset Dead End.

Nicopress Reducing Sleeve splice on wires of different sizes (before compressing).



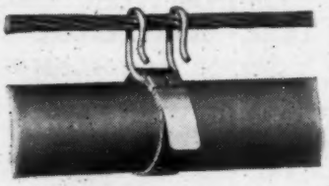
Nicopress Repair Sleeve used to replace defective old style joints.

Nicopress line wire Splicing Sleeve.



National cable ring installed on messenger.

National Adjust-A-Strap, partially installed. Notice split buckle to facilitate wrapping zinc strap around cable.



National Zinc-Wrap partially installed.

Nicopress Tool for compressing Sleeves.

THE NATIONAL TELEPHONE SUPPLY COMPANY

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

"It Seems to Us"

C. E. (Chris) Eaby, genial president of the Denver & Ephrata, (Penn.) Telephone Co., makes the life of an editor much easier through his thoughtfulness. Last week he notified us of the quandary the Berks & Lehigh Telephone Co., Kempton, was in when Ira Schroeder who had operated the magneto switchboard for the past 12 years, quit. The exchange was promptly offered for sale: lock, stock and barrel. Since the sale needs PUC approval, it looks like the community will be without service for awhile. Chris is president and general manager of one of the liveliest Independent companies in the Keystone State.

•

Autumn in the air makes us think of National Conventions and the fact we shall miss our annual get-to-gether this year especially with those from far-off places.

•

Even hard working company representatives get to play once in a while.

Pictured in this foursome at the Edgewood Valley Country Club, Chicago, on Valley Hoo Day from L. to R. are Herb Lansdell, vice pres., Hubbard & Co.; Colby H. Knapp, supply sales mgr., Strombery-Carlson; Ray Wagner, Hubbard & Co.; and Jim Pfaender of Stromberg-Carlson.

TELEPHONE ENGINEER AND MANAGEMENT

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Founded in 1909

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"... and rush it through, please"

"IT'S on Main Street, three-hundred and something, don't think she has a phone . . . and rush it through, please." It's an almost standard formula that buzzes daily in the ears of nearly every long distance operator. They take whatever comes, calmly, quietly and efficiently.

How operators and other telephone workers keep their heads, tempers and manners during the trying conditions of today is one of wartime's wonders. That they succeed in doing so is a tribute to the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

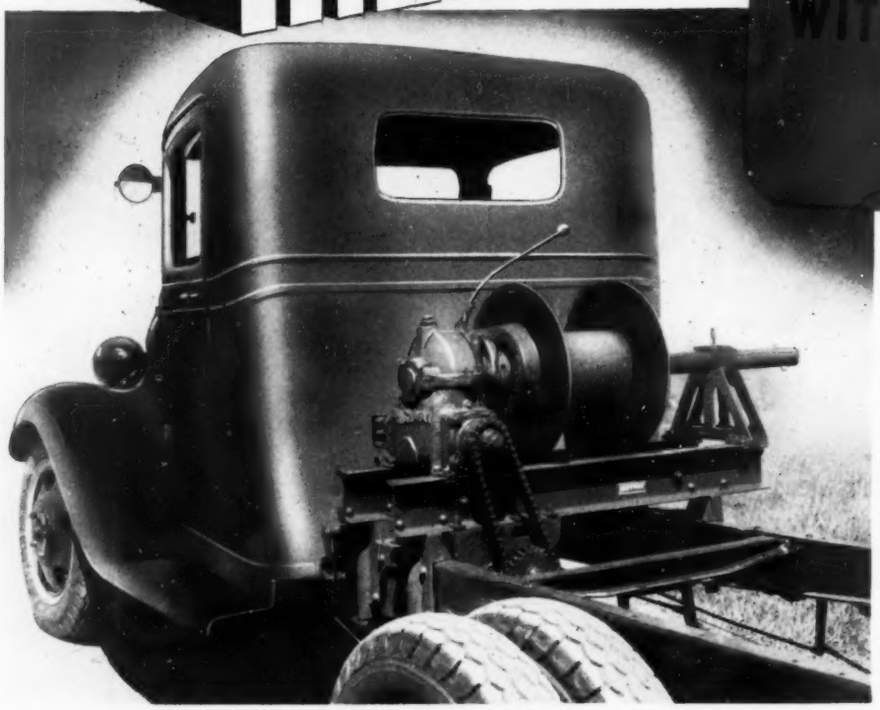
ARMY E NAVY

Exide
TELEPHONE BATTERIES

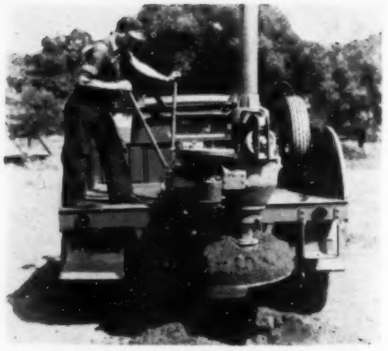
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

HIGHWAY

TOP PERFORMANCE WITH MAXIMUM *Safety*



Model L-12-C Winch



Model HD Boring Machine

Model LCW-102 Body

Highway winches are built to do their job easily, safely and efficiently. The single drum winch shown is made of electric cast steel and is used with middle type pole derricks. It is a small, free drum type, with ample strength for heavy-duty truck operation, yet its light weight permits use with 1½ and 2 ton chassis. Far from ordinary . . . it is tops in winches of this type.

Highway also offers efficient Propeller Shaft Power takeoffs as well as the easily installed "Transmission Type". Highway winches and power takeoffs are specifically designed for public utility work.

MODEL P-8-T POLE TRAILER

HIGHWAY TRAILER COMPANY

MANUFACTURERS OF

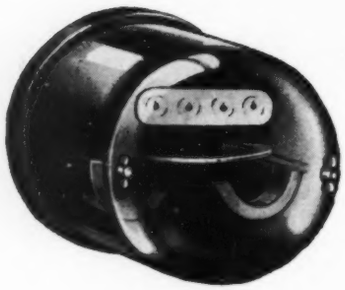
TRUCK TRAILERS AND BODIES • EARTH BORING MACHINES • WINCHES • OTHER PUBLIC UTILITY EQUIPMENT

General Offices

EDGERTON, WIS., U. S. A.

Only with PHILCO Floté Batteries
DO YOU GET ALL THE ADVANTAGES OF MODERN FULL FLOAT SERVICE
THE ECONOMY, efficiency and ease of maintenance identified with full float service are measurably increased when Philco Floté Batteries are on the job.
Only Philco Telephone Batteries have the famous Floté grid, designed and cast in a special high-efficiency metal expressly for the full float system. The result is—with Philco low cells are eliminated; internal losses are lower; charging and maintenance costs are reduced; batteries last longer.
The many advantages of Philco Floté Batteries have been demonstrated by scores of progressive Telephone Companies who use modern Philco Floté Batteries for central station and PBX requirements.
Write for latest catalogs of Philco Telephone Batteries—in modern steel glass, rubber or Vitrabloc jars. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey. Makers of the famous Philco "Thirty."
FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT
Floté in Glass
PHILCO
VITRABLOC
Floté in Vitrabloc
PHILCO

CALCULAGRAPH
DOES FOR LONG DISTANCE CALLS –



What METERS do for the GAS AND ELECTRIC UTILITIES

•

This METER measures kilowatt hours of electricity used

•

This METER measures cubic feet of gas consumed

•

MODEL 33

THE CALCULAGRAPH METERS the elapsed time of toll calls

The CALCULAGRAPH serves the telephone industry by printing accurate records of toll calls as a basis for billing. These records show starting time and the chargeable elapsed time to the second on each toll ticket.

Reliability and simplicity of operation have made the Calculagraph standard equipment for telephone companies throughout the world.

CALCULAGRAPH COMPANY

Incorporated 1892

310 SUSSEX STREET • HARRISON, N. J.

A Tribute

to all those who helped in the greatest scientific achievement of all time... the

ATOMIC BOMB

"TO KEEP THE PEACE"

For the inspiration and leadership displayed by the Executive, Military, and Naval authorities... to the Scientists... Engineers... to Labor, and to those Companies that played a part in this unprecedented achievement, General Cable voices the sentiment of America in extending highest praise and heart-felt appreciation. Because of their scientific genius, their untiring effort and their complete devotion to this gigantic task, Victory comes sooner and all mankind benefits.

General Cable Corporation is also justly proud of the contribution made by its own staff in the engineering development and manufacture of still secret and exceedingly special materials essential in the production of this device of war... and of Peace.

GENERAL CABLE CORPORATION

MANUFACTURERS OF BARE AND INSULATED WIRES *AND CABLES FOR EVERY ELECTRICAL PURPOSE*

General Cable Products for the Telephone Industry are Distributed by
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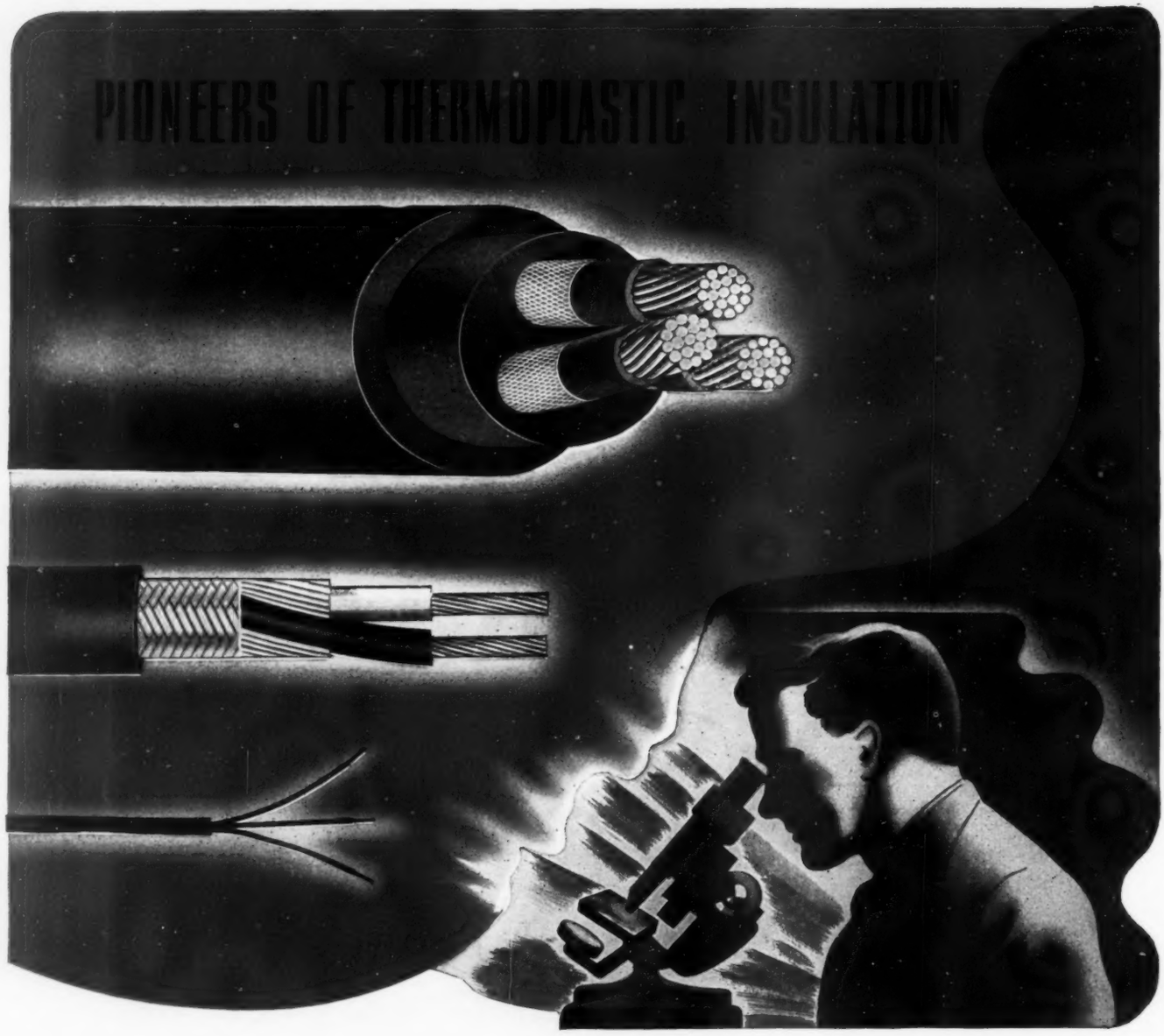

Thermoplastic insulation specialists . . . producing a complete line from fine wires to heavy power cables . . . serving: Public Utilities, Radio, Electronic, Appliance and Instrument Manufacturers, Telephone Companies and Contractors.

There are few, if any, other fields in which thermoplastics are solving more problems . . . or accomplishing more fundamental changes in industrial design . . . than in the insulation of wire and cable. Demand today the increased resistance which these new compounds and constructions offer to heat, flame, oxidation, chemical action, oil, grease, moisture, cold, abrasion, fungus growth and other severe conditions. Write NOW for complete information and samples engineered to your particular requirements. Remember . . . when you're thinking of PLASTIC you're thinking of US!

PLASTIC

WIRE & CABLE NORWICH CONN.

CORPORATION

MAKE SURE OF SERVICE

Buy TESTED

CONSTRUCTION MATERIALS AND SUPPLIES FROM STROMBERG-CARLSON

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In Canada: Stromberg-Carlson Company Limited, Toronto

STROMBERG CARLSON

PROGRESS IN TELEPHONY

STROMBERG-CARLSON

STURGIS METAL CHAIRS

Stromberg-Carlson can now offer prompt shipments both on Sturgis Low Chairs for Operators and Sturgis Standard Chairs for Operators. These metal chairs long have been favorites with operating companies and have just recently been put in production again.

LOW CHAIRS FOR OPERATORS

The No. 876-A has an adjustable seat height from 17 to 21 inches. The back support can be adjusted easily and quickly without tools or special keys. A choice of either genuine or imitation leather upholstery is offered. The seat is 15¼″ x 16¾″ with full saddle. The frame is of 1″ tubular steel with all joints welded.

DISTRIBUTED *Exclusively* BY STROMBERG-CARLSON

STANDARD CHAIRS FOR OPERATORS

18-22″
with footrest 5″ from floor
20-24″
with footrest 6″ from floor
22-26″
with footrest 8″ from floor
24-28″
with footrest 10″ from floor
26-30″
with footrest 12″ from floor
28-32″
with footrest 13″ from floor

HABIRSHAW No. 17 BRONZE DROP WIRE

High strength bronze conductor; expertly blended synthetic rubber insulation; soft, unbleached cotton braid thoroughly saturated to provide a long-lived moisture-proof cover. Supplied in 1,000 ft. lengths.

66 SUPPLY DEPOTS FROM COAST TO COAST SERVE STR

Recommends:

NICOPRESS No. 31-DC

Nicopress splices will withstand the toughest strains of vibration and have a lasting conductivity.

NICOPRESS No. 17-2

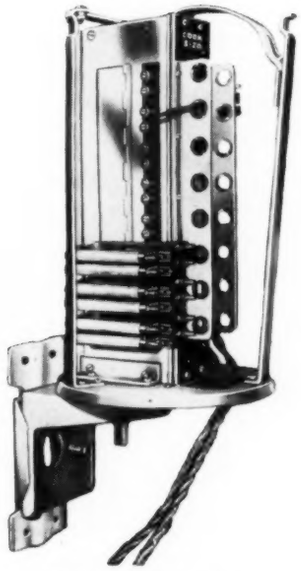
Convenient and practical for linemen to handle either in the air or on the ground. Pressure can be applied with the certainty that each compression will be exactly as required.

NICOPRESS No. 12 BWG Sleeves

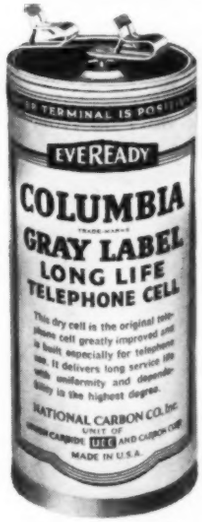
NICOPRESS No. 17 B & S Sleeves

COOK TYPE O SUBSTATION PROTECTORS

Weatherproof and fireproof. May be mounted in or outdoors.

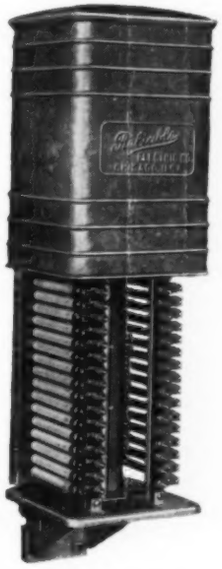


COOK TYPE S-20 CABLE TERMINALS With H-20 PROTECTOR UNITS Capacities 6 to 26 pair.



"EVEREADY" "COLUMBIA" "GRAY LABEL"

Long Life Dry Cells with Fahnestock connections. Specially designed for telephone work and light drain service.



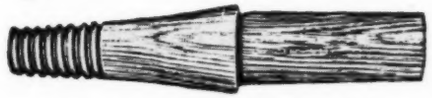
RELIABLE B-27 CABLE TERMINAL

Places all connections within convenient reach of the lineman without necessity of removing fuses.

CARRIAGE BOLT

FIR CROSSARMS

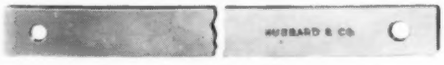
MACHINE BOLT



1¼ x 8" WOOD PINS

LAG SCREW

WESTERN UNION 2 x 2⅜ x 12" OAK BRACKETS

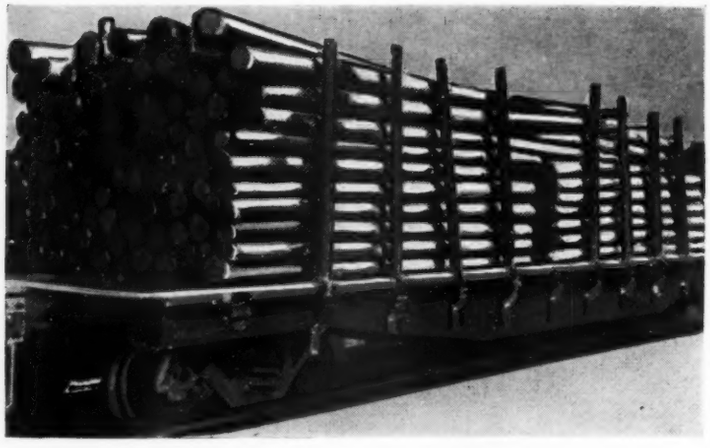


CROSSARM BRACES

STROMBERG PROGRESS IN TELEPHONE CARLSON

STROMBERG-CARLSON CUSTOMERS

STROMBERG-CARLSON *Recommends:*



PINE POLES

Stromberg-Carlson offers a fine grade of pine poles prepared by the Rueping Process which literally pumps creosote oil into the wood cells to combat nature's attacks on pine, and which results in a thoroughly reliable pole.

HEMINGRAY
No. 42 INSULATOR

Standard for many years. Its long leakage path keeps toll lines trouble-free.

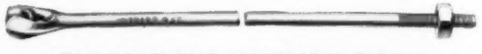
HEMINGRAY
No. 9 INSULATOR

The exchange line pony. Standard on many telephone lines.

HEMINGRAY
No. 12 INSULATOR

Double groove pony provides substantial support for line wire.

THIMBLE-EYE BOLTS



THIMBLE-EYE ANCHOR RODS

INSULATED SCREW EYES

No. 6061

No. 6062

PORCELAIN TELEPHONE KNOBS

Stromberg-Carlson offers telephone knobs in a wide variety of sizes.

STROMBERG CARLSON
PROGRESS IN TELEPHONY

ARMY E NAVY

For permanent peace

Buy War Bonds!

AVAILABLE SOON

COFFING HOISTS and Utility Maintenance Tools

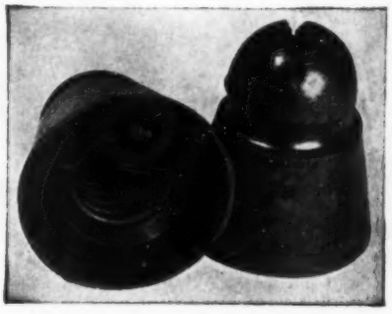
Will soon again be available to the Telephone trade and other lines of industry. After almost four years of day and night production for the Armed Forces we are now in position to accept and schedule your orders. We are proud of the production record we have made and of the important part COFFING products played in helping to restore Peace on Earth. Our standard line of hoists were used by our fighting men so there is no reconversion period for us.

WRITE FOR OUR NEW FOUR-PAGE FOLDER NO. Z-4.

COFFING HOIST COMPANY DANVILLE ILLINOIS **U.S.A.**

FOR STEEL OR WOOD PINS

UNBREAKABLE INSULATORS



MADE OF RUBBER

SAVE ON OUTSIDE CONSTRUCTION

Eliminate Replacement Costs

This insulator answers the breakage problem. Due to special features in design the unit has low leakage loss during wet weather and will remain live and free from checks for many years.

Order direct or through your jobber

$9.35 per hundred — F. O. B. Chicago — as long as supply lasts

COMMUNICATION EQUIPMENT & ENGINEERING CO.

5646 Race Avenue **CHICAGO, ILLINOIS**

DRAKE A NAME TO REMEMBER for RELIABLE SOLDERING EQUIPMENT

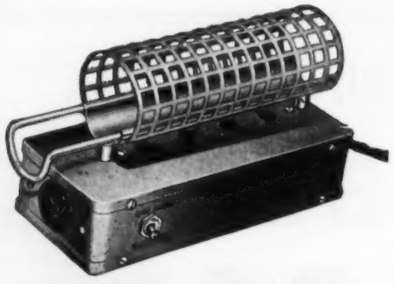
Through 25 years of soldering iron manufacturing, Drake has developed soldering products that set new high standards of quality and long-lived performance.

DRAKE No. 400, for example, is ideal for work in small places—weighs only 8 ounces and is only 9 inches long, yet it is a 60-watt iron.

DRAKE No. 600-10, is conservatively rated at 100 watts, but is only 10 inches long.

DRAKE SOLDER POTS

are available in 150 and 300 watt ratings to meet varying needs.



DRAKE HEAT CONTROL

is a fool-proof device for keeping idling irons ready for quick use.

*GraybaR QUALITY SINCE 1869 *REG. U.S. PAT. OFF. Distributed by *GraybaR ELECTRIC COMPANY

Immediate shipment from stock on moderate quantities with priority rating of AA-5.

DRAKE ELECTRIC WORKS, INC.
3656 LINCOLN AVE. CHICAGO 13, ILL.

ALWAYS AT YOUR SERVICE!

We do Engineering, Construction

or

Appraisal Work in many sections of our country

We can help you!

Call or write

GUSTAV HIRSCH ORGANIZATION

310 W. Broad St. Columbus 8, Ohio
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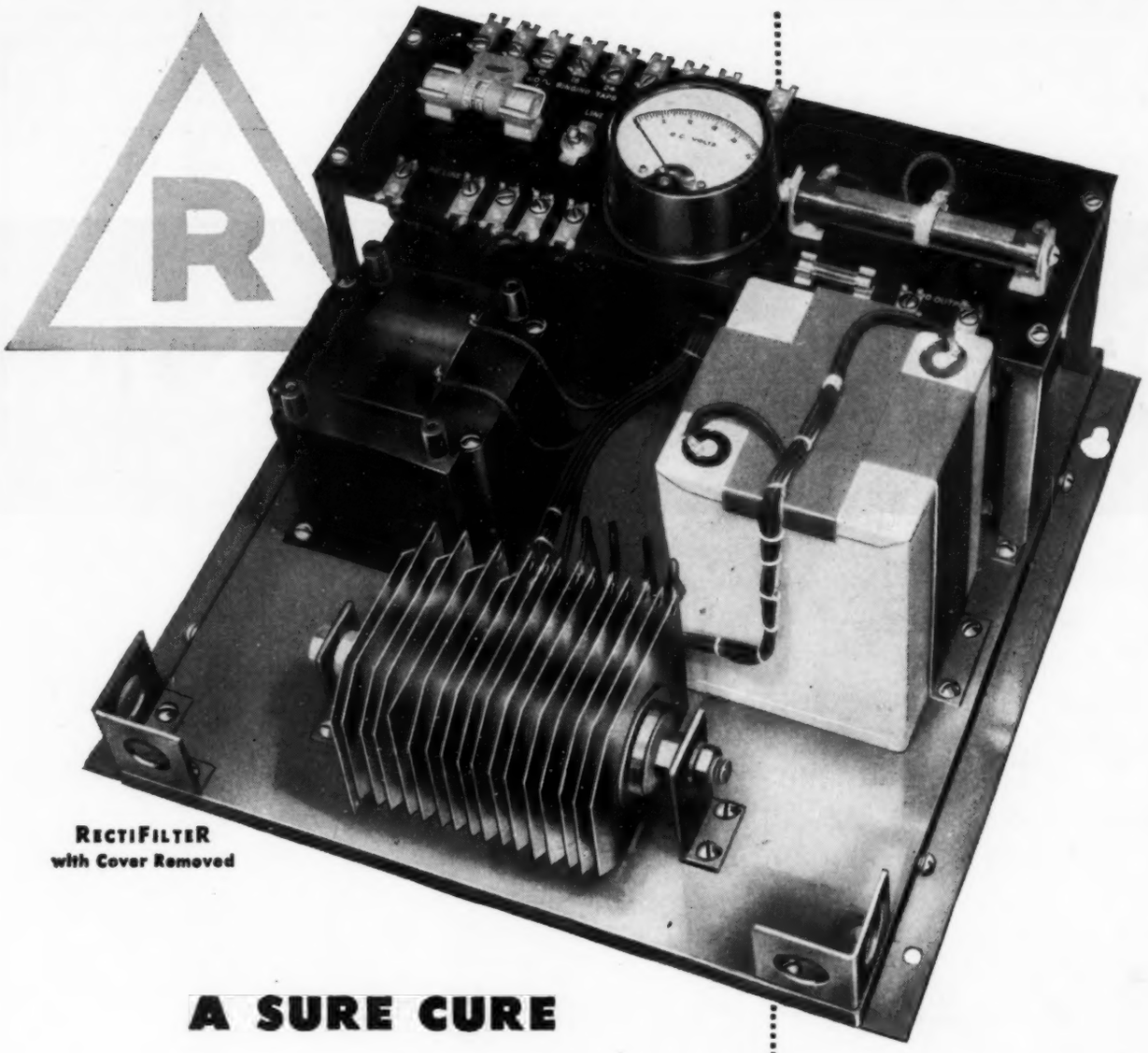
Nationally and Internationally known



RECTIFILTER
with Cover Removed

A SURE CURE

FOR POWER SUPPLY PROBLEMS

in PBX and PAX Service...

RAYTHEON RectiFilteRs

Raytheon RectiFilteRs, battery eliminators, will solve your power supply headaches by providing stabilized D.C. current directly from A.C. lines. They are efficient, compact and require no adjustments. Simply plug them in and they'll take care of themselves. No moving parts mean no wearing parts, assuring long life. Write for Bulletin.

RECTIFILTERS

- Eliminate batteries and the expense of routine service.
- Release charging cable pairs, at remote locations, for revenue producing service.
- Provide stabilized D.C. output voltage from no load to full load.
- Minimize power costs because of high efficiency in converting A.C. to D.C.
- Save $30 to $90 a year.
- Wide range of models for varied operations . . . 50 to 60 cycles.

Tune in the Raytheon radio program: "MEET YOUR NAVY," every Saturday night on the Blue Network. Consult your local newspaper for time and station

RAYTHEON
MANUFACTURING COMPANY
Electrical Equipment Division
190 WILLOW STREET, WALTHAM, MASS.

The coveted Army-Navy "E", for Excellence in the manufacture of war equipment and tubes, flies over all four Raytheon Plants where over 16,000 men and women are producing for VICTORY.

Devoted to research and manufacture of complete electronic equipment; receiving, transmitting and hearing aid tubes; transformers; and voltage stabilizers.

When his ship comes in...

The advertisement on the opposite page is especially timely now, when thousands of men are streaming home from overseas.

Appearing in national magazines during September, it asks every one to help keep Long Distance wires clear so that soldier calls can go through quickly.

It should help the whole telephone industry handle today's big job.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

Suppose *you* hadn't been home for 3 years?

Chances are, the first thing you'd do when you got near a telephone would be to call the folks back home.

That's happening thousands of times every day now and we'd like to get every one of those calls through as quickly as possible.

So if the Long Distance operator says — "Please limit your call to 5 minutes" — that's to help everybody. It might be a service man who is waiting to get on the line.

BELL TELEPHONE SYSTEM

LISTEN TO "THE TELEPHONE HOUR" EVERY MONDAY EVENING OVER NBC

LENZ WIRES AND CABLES

LOOK FOR

LENZ

THIS MARK OF QUALITY

WHERE QUALITY COUNTS

Millions of feet of LENZ saturated core type Cable in service today give evidence of the high Quality of this product.

The conductors and insulation of LENZ Wires: Telephone, Switchboard and Jumper are the finest obtainable, assuring longest possible service.

The LENZ Organization has delivered Quality for 41 years and you can depend on every one of its products. They give Performance Unlimited. Write today for complete information.

DISTRIBUTORS

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LENZ ELECTRIC MANUFACTURING CO.

1751 N. WESTERN AVE., CHICAGO 47, ILL., U. S. A.

"IN BUSINESS SINCE 1904"

QUICKLY DETECTS MOISTURE

Protek-Sorb* desiccant goes into action fast! The specially-processed small mesh size flows into open spaces . . . gets into the corners and crevices . . . penetrates between wires . . . where it absorbs all moisture almost instantly.

Protek-Sorb desiccant has a greater capacity for moisture than other desiccants. It is chemically inert . . . does not attack metals or insulation. Gives off no harmful fumes.

These and other advantages enable Protek-Sorb desiccant to dry splices faster and restore insulation resistance quicker . . . reasons why many leading telephone companies rely on Protek-Sorb desiccant.

Your regular telephone jobber supplies Protek-Sorb desiccant. See him today.

*Reg. U. S. Pat. Off.

THE DAVISON CHEMICAL CORPORATION

Progress through Chemistry

BALTIMORE-3, MD.

Canadian exclusive sales agents for PROTEK-SORB desiccant: CANADIAN INDUSTRIES LIMITED, General Chemicals Division

It's time to face FACTS

AS reconversion proceeds and the manufacturers of telephones, switchboards and other telephone parts get back into their normal stride, the flow of new equipment will soon ease the pressing needs of operating companies.

With this new equipment available—with rationing of vital materials and the shortage of manpower a thing of the past, ***the unusually high prices for old and worn equipment that have been prevalent during the past four years will be gone forever.***

It is time to face FACTS! . . . ***time to dispose of every old unusuable piece of telephone equipment you have.*** Check through your stockroom today—make sure that you clean house while there is still a nice cash market available . . . A mere few months from today may be to late.

for PROMPT DELIVERY We Offer . . .

Switchboard Cords
Desk Stand Cords
Receiver Cords
Receiver Shells & Caps
Receiver Diaphragms
Mouth-pieces
Oak Wall Phone Cabinets
Rebuilt Transmitters
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Rebuilt Induction Coils
Rebuilt Lightning Arresters
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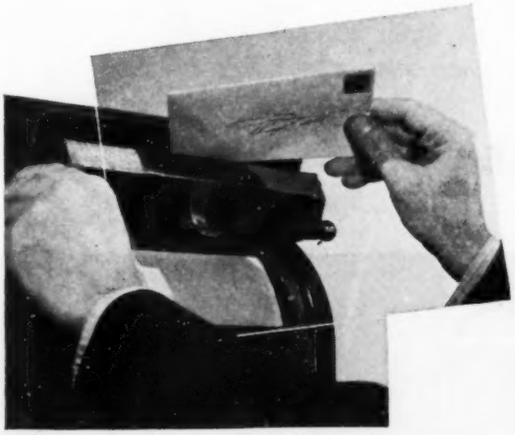
We Are Taking Orders for Supply and Repair Parts

Cable Terminals
Cable Test Sets
Lineman's Test Sets
Fuses
Interior Wire
Galvanized Iron Line Wire
Twisted Pair or Parallel Drop Wire



Write us today giving complete description of what you have. We'll submit an offer by return mail.

TELEPHONE REPAIR & SUPPLY COMPANY

DAN'L H. McNULTY, President & Manager
Rogers Park Station, CHICAGO 26, ILLINOIS

THREE MEN dug fifteen holes in one hour in fair soil . . . . .

TWO MEN dug 18 holes, set poles, and strung wire (two-wire line) in 12 hours . . . .

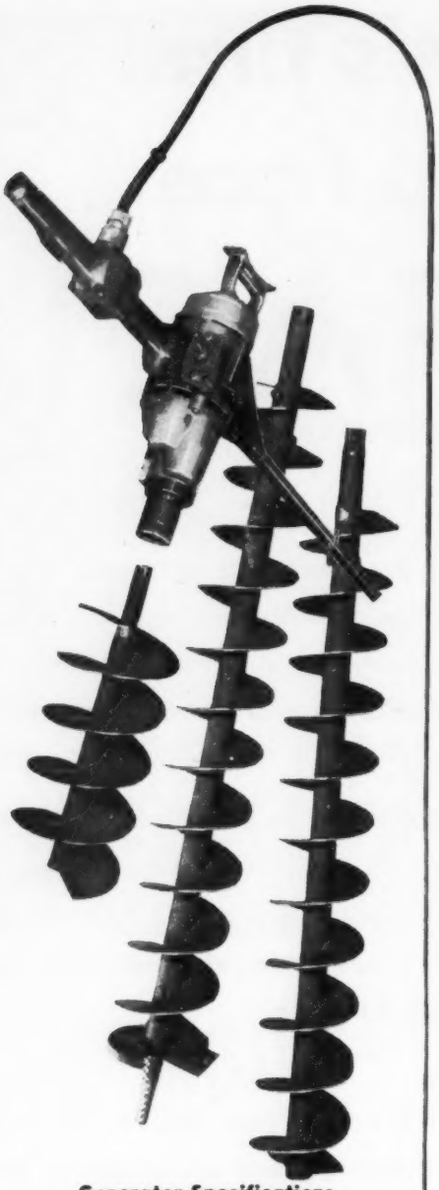
SEVEN MEN set 240 poles in 30 hours in bad soil . . . . .

Here's Proof of Savings YOU Can Make WITH THE KA-MO EARTH BORING DRILL

Not just claims—but ***facts!*** These are typical results that telephone men are getting by using the KA-MO portable power driven drill for anchor and pole hole work. These results provide convincing proof of the ability of KA-MO to end digging drudgery and reduce construction costs.

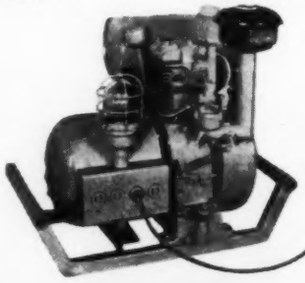
Designed for fast, easy work in any kind of soil, mud, sand, or clay, KA-MO's heavy duty electric motor puts down 8- to 12-inch-diameter holes in amazingly short time. Cuts digging time 50% to 75%. Simplifies work in hard-to-reach places, and is ideal also for installing anchors and ground rods.

Power for operation is supplied by a 2½ kw a-c engine-generator set which is easily carried by two men, and is compact enough to be carried in truck or small service car. Write today for complete details showing how you can save by putting KA-MO to work for you.



Generator Specifications

2½ kw a-c generator direct connected to gasoline motor. Output: 115 volts, 60-cycle, single phase. Dimensions: 36" long, 25" high, 19" wide. Serves also as a standby power source for exchange emergencies, and for operating light and small electric tools. ***KA-MO is also available with 3 kw d-c generator.***



KA-MO EARTH BORING DRILL

KA-MO TOOLS, INC.

5525 WEST OHIO STREET CHICAGO 44, ILLINOIS

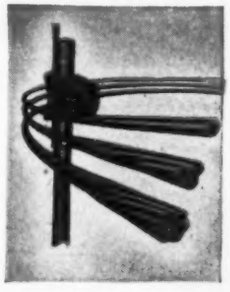
"LET'S TAKE IT APART"

IT'S EASIER SAID THAN DONE

. . . it's Copperweld!

We really punished this sample—cut from a Copperweld ingot—to test the molten-weld between the copper and the alloy steel core.

Saw cuts were made radially at several points completely through the copper and into the alloy steel. The segments were bent backwards and forwards until fracture resulted. The copper broke under repeated bending but not once did the break occur in the area of the molten-weld.



While Copperweld is continually improving its products, the original and exclusive Copperweld principle of the molten-weld is so sound that it has never had to be changed.

Thirty years of successful performance in the power, communication and railroad industries attests the fact that you can always depend on Copperweld wherever you need a high quality wire with the strength of steel and the conductivity and long life of copper. Engineering data on request.

In all the world there is only one COPPERWELD—with copper molten-welded to alloy steel.

COPPERWELD STEEL COMPANY

Glassport, Pa.

Meet

A NEW MEMBER OF THE STROMBERG-CARLSON FAMILY

In its new No. 1240 series of telephones, Stromberg-Carlson offers a group of instruments which, while identical in external appearance with the Company's preceding series, offer several design features not found previously.

The Handset is modern in style. It contains a capsule type carbon transmitter and a capsule type receiver. All connections are made through spring contacts which are fastened securely to inserts molded in the handle. Both receiver and transmitter are so designed that they simply are placed in their respective compartments and tightly clamped in place by earcap and mouthpiece.

The induction coil and the capacitor, along with much of the internal wiring, are potted in a tar-like compound and enclosed in a plastic case which also serves as terminal strips for the telephone. The result is not only an improved internal appearance of the telephone, but also a decided reduction in the number of parts which must be stocked by the operating company. Furthermore, this construction protects these important units from changing atmospheric conditions and variations of temperature.

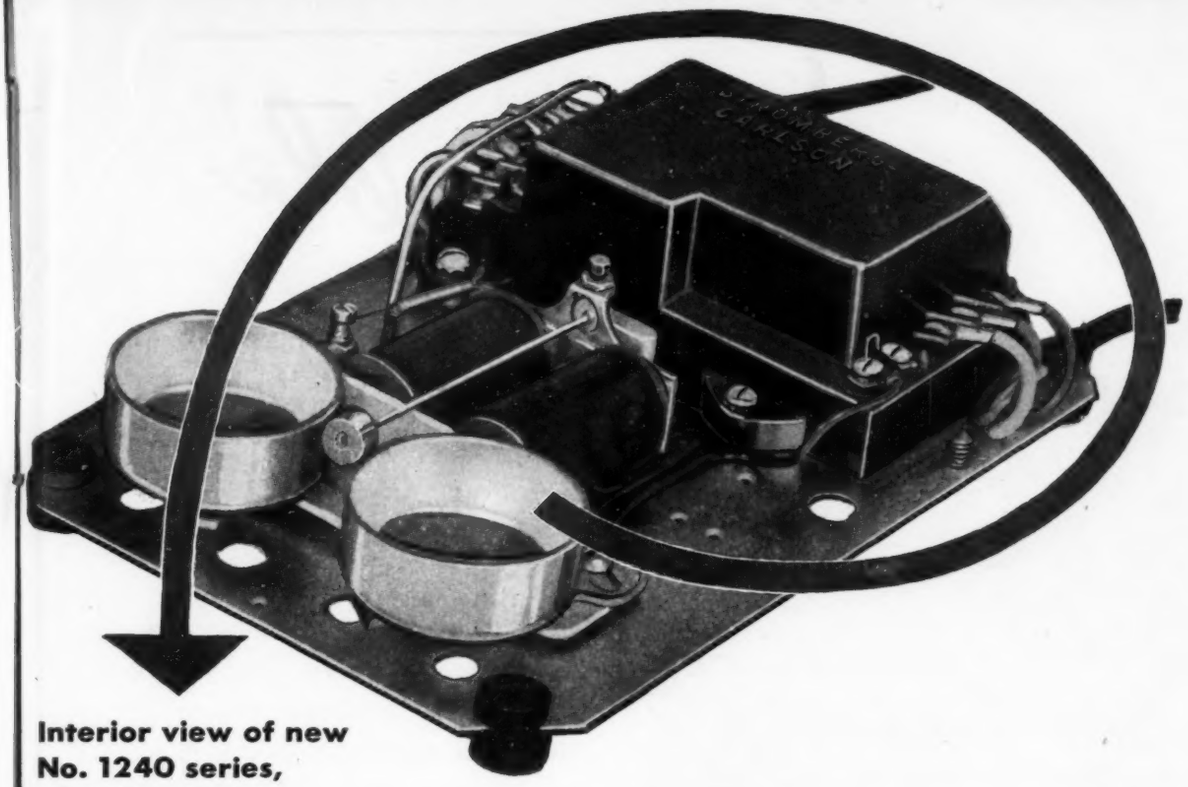
The ringer magnet is surrounded by a clear plastic window. This permits the use of a steel base and also allows external visual inspection of the ringer code marking.

The wiring to the hook switch and dial is contained in separate cables with braided covering.

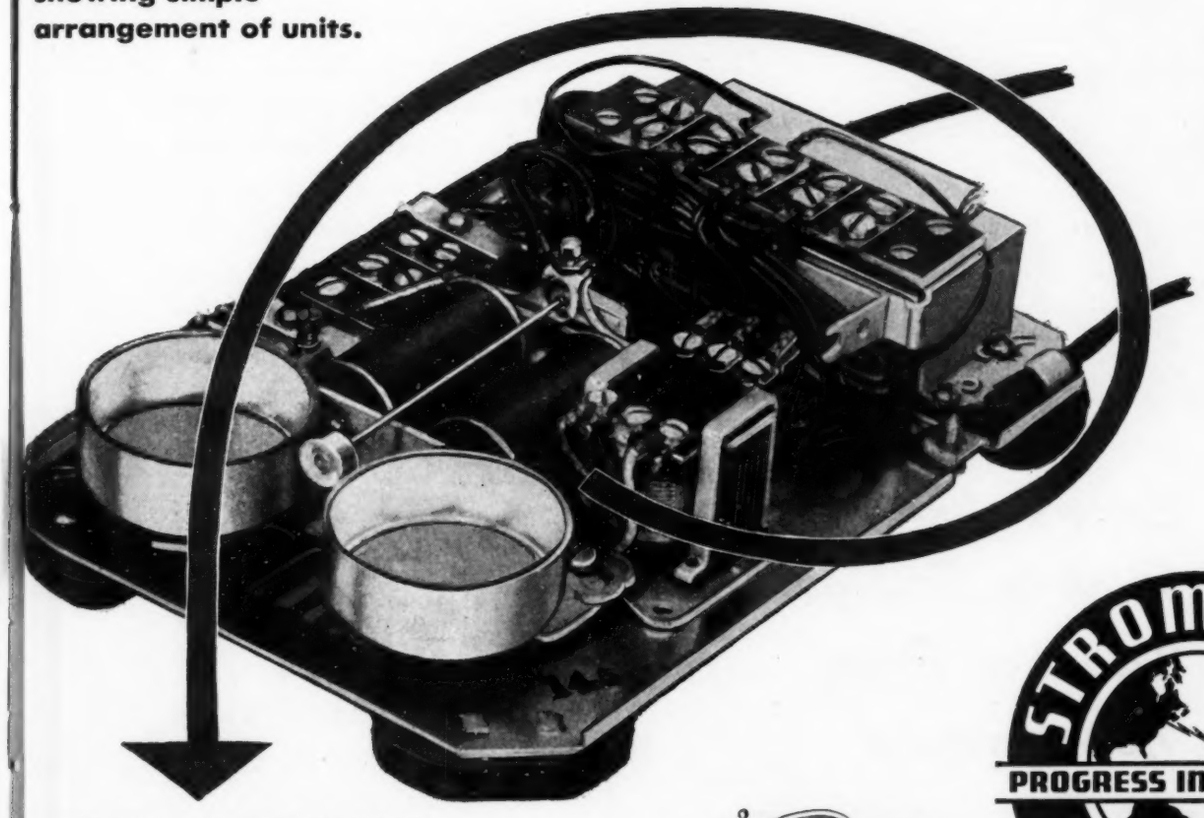
Write for test samples.

STROMBERG-CARLSON

Factory, General Offices: Rochester 3, N.Y.
Branch Offices: Chicago 6, Kansas City 8, San Francisco 3
In Canada: Stromberg-Carlson Company Limited, Toronto



Interior view of new No. 1240 series, showing simple arrangement of units.



Interior view of previous Stromberg-Carlson Desk Set Telephone.

STROMBERG CARLSON

PROGRESS IN TELEPHONY

ARMY E NAVY

LET'S NOT LET UP!

Victory is here but let's keep on buying War Bonds to make peace permanent.

"Reliable"

is the word for it!

Easy to Install
High in Strength
Vibration Proof
Non-Corrosive

Reliable in uniformity of strength and conductivity of connections with long service life. Made of high strength bronze, Reliable Solderless Connectors cannot be distorted with a standard socket wrench. Once installed they're there to stay. Precision Threads provide a high percentage of torque efficiency—friction is reduced to a minimum—pressure on the conductor is maximum. They are vibration-proof—yet can readily be re-used. Reliable Solderless Connectors are available for use with all types of conductors. Build for the future—specify Reliable.

RELIABLE ELECTRIC COMPANY

3145 CARROLL AVENUE
CHICAGO 12, ILLINOIS

OVER 35 YEARS SERVICE TO THE TELEPHONE INDUSTRY

EDITORIAL

The Telephone Company's Reconversion Job

THE manager of an Independent telephone company said to us the other day, "When I think of the present state of our plant, I feel like I think a good housekeeper would feel when she had been unable to do any house cleaning for five years. She would be unable to rest until she got her hands on a broom and a mop and other household tools and started chasing the dirt. I'll be unable to rest until I can get started at straightening up this telephone plant of ours."

It is to the credit of the telephone industry that, from the very first days of the country's defense program, and all through the war, it devoted its energies to giving the best and most telephone service possible with the smallest possible use of critical materials, and that it did this not grudgingly, but in whole-hearted cooperation with the Government agencies handling such affairs. On a number of occasions the industry was complimented by the War Production Board, and by other Governmental agencies, for its energetic cooperation with Government in the war effort, and its ingenuity in devising methods of doing that without impairment of telephone service or the use unnecessarily of a single ounce of critical materials.

Many of the ways by which those things were done were, however, admittedly makeshift measures, at times in violation of good engineering practices, and frequently much more expensive than methods used to obtain the same results in normal times. But an emergency existed, and the industry did its best to meet it.

In consequence, a lot of conditions now exist in telephone plants that are impractical from a long-pull service or plant standpoint. The first job of the industry, in its reconversion from wartime to peacetime operation, is to get its plant back to normalcy from the standpoint of good engineering and good operating practices.

But that is only a part of the telephone company reconversion job. Another part of the job is the taking care of deferred maintenance—the repairs and replacements that could not be made during the war. Indications are that there is a considerable amount of work of this kind to be done.

THEN there is another job of reconversion—the job of overcoming certain types of obsolescence in plant and equipment; particularly in subscribers' station equipment. A part of this job is aptly illustrated by the exchange manager who said a few days ago: "Every time I look out of my office window, I am afraid I'll see a bunch of subscribers on the way to ask me when I am going to come and get those old candle-stick type desk telephones I installed for them during the war and replace them with modern instruments."

Of course there is, too, the good old-fashioned proposition of construction—a word the industry can now put back into its vocabulary. Those days are returning when the engineer and the plant superintendent can plan and carry out extensions and replacements of plant and other types of construction, in the normal way. There is a lot of deferred construction, as well as deferred maintenance, to be taken care of by the industry.

Following those things there will come, in due time, the propositions of replacement or conversion of or additions to central office equipment. But that will stretch over a considerable period of time in the future. One reason for that, among others, is that all the equipment necessary for such undertakings cannot be made available excepting over a period of time.

Altogether, the Independent telephone industry has a real job of reconversion ahead of it. Telephone people are going to be pretty busy, for some time, putting their plants and other affairs in condition to meet the service demands and requirements of the postwar era that is now here. But, when the work has been done, the Independent telephone industry will, we think, be in better shape than it has ever been in before.

Base frames are used to brace the poles which otherwise would have their foundations washed away by the heavy tropical rains.

the Lae to Finschafen, New Guinea Pole Line Came Into Being . . .

WITH his face sweating in the equatorial heat and his fatigues in tatters from crashing through the thorns, vines, creepers and crawlers that make up a New Guinea jungle, the U. S. Signal Corpsman may be thinking now what a breeze it will be clearing a right of way back home when the good old return to U. S. orders come through. But until they do, our boys will continue with such problems as the hazardous undertaking of clearing a pole line right of way through the virgin jungle territory of New Guinea.

The first assignment of this nature went to the 436th Signal Construction Battalion. The job was to construct a communications pole line from Lae to Finschhafen on the eastern coast of New Guinea.

The battalion began the project early in January, 1944. There was no experience in the annals of line construction to guide them and they had to learn the hard way. The first thing they learned was that vehicles could not be used in the jungle except for relatively short distances. Thus, they were forced to use barges that crept along the Huon Gulf. The barges were piled high with equipment and personnel; they landed at a designated point; the men hacked out a piece of the jungle, put up the poles and line; and everything was returned to the boats to move to a new point.

Originally, the Transportation Corps provided the battalion with two LCM's (landing craft, mechanized) and six LCVP's (landing craft, vehicles, personnel) and the Engineers furnished an officer and 29 enlisted men of the 542nd Engineer Boat and Shore Regiment. However, because of the need for these men and the equipment in combat operations, both were shortly recalled. The 436th was left with one small motor launch, hardly large enough to ship rations and not capable of being beached—a necessity in this sort of work. The line was consuming six tons of material to the mile, and, in addition, all the tools, equipment and men had to be transported.

A frantic search for seaborne transportation began. Four abandoned LCM's and five half sunk LCVP's were found in the Lae harbor. They were scarcely seawarthy—the hulls were rusty, motor parts had been cannibalized, and the boats leaked; expert opinion advised the men not to attempt to use them. However, with an effort born of desperation the mechanics of the 436th somehow managed to patch the ships together and the 436th found itself with a fleet.

THE men of the battalion, experienced pole linesmen and construction men, had to operate these boats and barges. This involved navigating up and down the New Guinea coast day and night under blackout conditions attempting to avoid the razor edged coral reefs that dot the shore. By force of necessity the landlubbers became sailors and before they were through they knew the waters of the coast as thoroughly as any Mississippi pilot knows his river.

Until the 436th completed their line, military communications between the important posts of Lae and Finschhafen were poor. There was a native trail, kept open by the perpetual swinging machetes of Papuan natives and used by the native runners. A survey quickly showed that the trail could not be used for the pole line because much of the terrain over which the trail led would not support the poles.

The initial survey also quickly demonstrated that there were no accurate maps of the area. Observation planes were sent up and the information obtained was far from reassuring. In addition to the jungle there were formidable water barriers—many rivers, the Busu, Burep, Bunga, Bulu, Bukang, and many others of equally strange names.

A reconnaissance party charted the way by compass and the work began. One of the greatest problems, suffered but never solved, was the insect hell. The linesmen, mucking through the fetid morass, trampled on breeding spots and stirred the mosquitoes up to daylight activity. The vicious red ant was a constant tormenter. These and innumerable other tiny and not so tiny creatures, some common and some never identified by an entomologist tortured the men during the entire project.

Then there were swamps. Stagnant quagmires filled with rotting vegetation had to be crossed. Men, neck deep in oozing muck, had to carry material and equipment through these swamps. Poles wobbled and fell in the watery foundation and had to be braced with frame bases.

SHORTLY after the line was started the rainy season began. Aside from the personal discomfort caused by the torrential downpours there were technical problems created. Even on comparatively hard ground, holes dug as pole emplacements quickly filled with water. Natural hydraulics widened the holes into useless craters.

The only solution was to sink the poles with lightning speed and replace the earth as quickly as possible.

There was as much work off the line as on it. A bulldozer was found to be essential to clearing underbrush that took hours of hand labor to cut away. But there was none available. Finally, a group of the men found a large Australian HD7 Allis Chalmers dozer that had been abandoned in the jungle many years before. The transmission housing was cracked, the brakes locked, many parts missing, and every part that could get rusty was as rusty as it could get. However, salvage parties were dispatched to find parts on the wrecked barges and ships along the coast and soon the dozer was put into operation.

With but 250 axes and 100 saws allotted to the unit there was always the cry for more tools. But more tools could not be obtained. Tool dressers worked all night, every night, sharpening the tools and repairing them so that the full quota could be constantly in use during the day.

HASTY field ridges had to be constructed across the nunterous streams that crossed the path of the line every few miles. And because they only had time to build crude spans their structures often collapsed when a stream, swollen by a tropical rain, struck the bridge. At one point, between the Buhem and Busa rivers, the mountains extend directly to the sea, terminating in a precipitous cliff that provides no landing point for barges. This portion of the line had to be supplied from the other end.

It took many months to finish the line. It was well into 1944 before the last wire was strung. A description of the line hardly tells the story. The line has two cross-arms with four circuits each of 200 pound bare copper wire. The wire, of Australian manufacture, is the equivalent of the American 104. The top arm is transposed for carrier circuits and the lower arm is for local circuits. One CS-5 carrier telephone system is employed with associated 40-C-1 carrier telegraph equipment. The line extends for a distance of 81 miles.

While the construction work is completed, the job isn't done and never will be done. For, while the jungle has suffered a temporary defeat, it never gives up. Patiently, it hovers over the efforts of its temporary masters, waiting for any sign of the relaxation of maintenance efforts so that it can reclaim the lost ground. Every day trees fall across the line, vines and aerial vegetation try to form a choking mat around the wires.

In the Signal Corps photos that make up the panel pictures, an idea is given of the hazardous undertaking in setting up a jungle pole line. Cpl. Roy Neidesser, of La Grange, Oregon, wades through a swamp in the construction area.

Showing part of the right of way that has been cut. And in the jungle, if you turn around, the trees seem to grow right back again.

A barge is beached on the Huron Gulf to haul equipment for the construction sites which motor vehicles could not reach.

Wire is being strung on one of the steel poles that were used to combat the problems with wooden poles rotting.

Although the pole in the picture on the opposite page is of native timber, it was soon discovered that all wooden poles had to be replaced by steel. Even the hardest woods quickly rotted in the jungle.

★ *Special Issue Features*

CONDUIT TYPE BASEBOARDS

Adequate Building Wiring

WITH electrical power and communication services playing such an important part in our every day lives it can be anticipated that future building construction will take into account the need for an adequate number of power and telephone outlets, particularly in office buildings. Telephone companies are frequently put to considerable expense and the subscriber to serious inconvenience when telephones are installed in buildings which have made no advance provisions for such service.

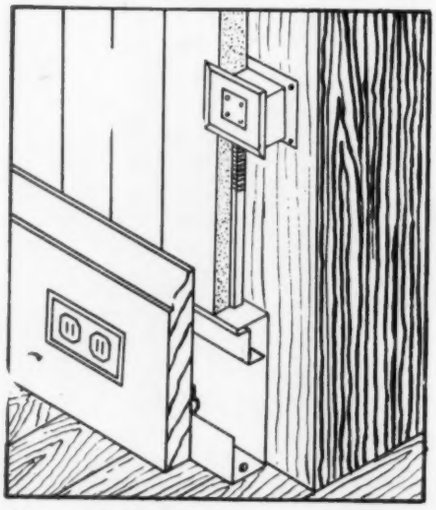


Fig. 1—Perspective view of baseboard conduit.

A development which is now on the market and which telephone company managers should call to the attention of building architects in their communities is the *Erecto-lock type conduit base* shown in Fig. 1. This development consists of a special metal channel conduit which is recessed behind the ordinary wood or metal baseboard and which can carry both power and telephone wiring.

Advantages of Baseboard

THIS baseboard conduit is characterized by its large wire carrying capacity and its accessibility. The baseboard is readily removed for access to the wires, thus permitting outlets to be provided in any part of a room on a moment's notice. The usual time consuming procedure of fishing in walls for wires is eliminated. A cross section of the baseboard conduit is shown in Fig. 2.

Drawings courtesy Charles Barnes & Sons

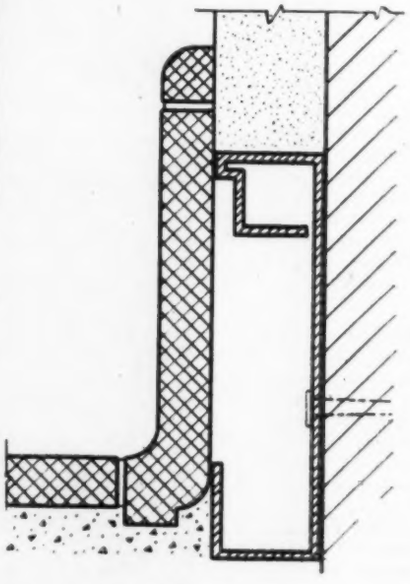
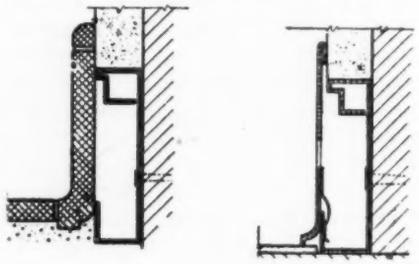


Fig. 2—Cross section of baseboard conduit.



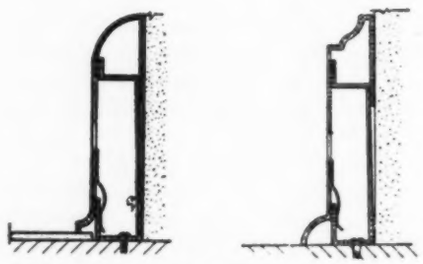


Fig. 3—Cross section view showing several styles of baseboard conduit.

This new unit will function with all popular wall material such as plaster, tile, wallboard, plywood and wood paneling. Knockouts are placed in the metal channel irons on 40 inch centers. The material is made of twenty gauge steel and is available in 10 foot lengths. Fig. 3 illustrates the several styles in which baseboard conduit is available.

Coaxial Telephone Channels

A COAXIAL TELEPHONE system consisting of a single conductor and its shielded covering is capable of providing 480 one-way channels when a frequency band several million cycles wide is used. A correspondingly greater number of channels could be obtained by use of a wider frequency band.

Separate coaxial units are required for each direction of transmission. The coaxial cables now being installed by the Bell System consist of several (four to six) coaxial units plus some ordinary paper insulated paired conductors as shown in Figure 1. Repeaters are required at intervals of from six to ten miles.

The success of the coaxial cable is due largely to the fact that due to the high frequencies employed, the signal currents carried by the coaxial unit tend to flow on the inter-surface of the tubular shield and do not interfere with other circuits carried in the same cable sheath. Likewise interfering currents from outside sources tend to stay on the outer surface of the shield and are not effective in creating noise of cross-talk voltages in the coaxial circuit.

Another feature of coaxial cable is its low dielectric loss which permits successful operation at the high frequencies used. This low loss is obtained by the use of low loss dielectric spacing washers rather than a solid dielectric. The a-c power required for operating intermediate amplifiers at points where no power supply is available is fed over the same coaxial conductors that carry the high frequency signal current. Many coaxial channels are obtained by using the same basic modulating apparatus which is used in the type K and type J,12 channel carrier systems. A number of these 12 channel modulators are used to obtain the multiplicity of channels that can be carrieid over a single coaxial unit.

Coaxial Frequencies

The basic modulator frequencies of the 12 channels, i. e., 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100 and 104 kilocycles are used to group modulated groups of successively higher frequencies to give the desired number of channels. For example, basic group 20 would be translated into frequencies of 968, 972, 976, 980, 984, 988, 992, 996, 1000, 1004, 1008, 1012, and 1016 kilocycles and these frequencies would be transmitted to the distant terminal over the coaxial line. On a 480 channel system there would be 40—12 channel groups of frequencies.

In addition to providing a multiplicity of telephone channels, the coaxial system can be used to carry television programs.

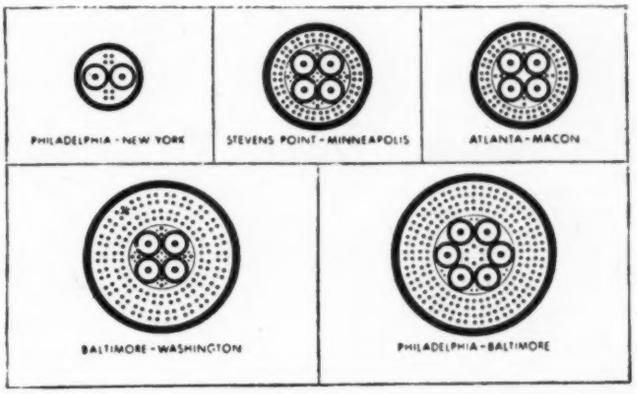


Fig. 1—Types of coaxial cables installed to date.

(Note — Coaxial units are shown by single dot and circle. Quadded units are shown by four small dots.)

Simplified Wiring Diagrams

TELEPHONE circuit diagrams are apt to become complicated due to the multiplicity of wires extending between the various components of a circuit. Sometime ago the Bell System inaugurated a new drafting method which results in considerable simplification of circuit drawings yet does not sacrifice any of the utility of the drawings when used for installation or trouble hunting purposes.

The wiring diagrams made by the new method are known as *highway diagrams.*

The various components such as relays, jacks, keys, etc. are shown on the drawing in approximately the same relationship they occupy on a mounting rack, but the wires running between the various components are grouped together and shown by a single heavy black line. Each individual wire is numbered at the point at which it enters or leaves the highway line. Only two digit numbers are used and additional highways are shown when there are more than 100 wires to be grouped together.

This highway scheme results in a substantial saving in drafting time and many telephone men prefer it to the old plan of showing all the wires. Fig. 2 illustrates a section of a drawing of this type.

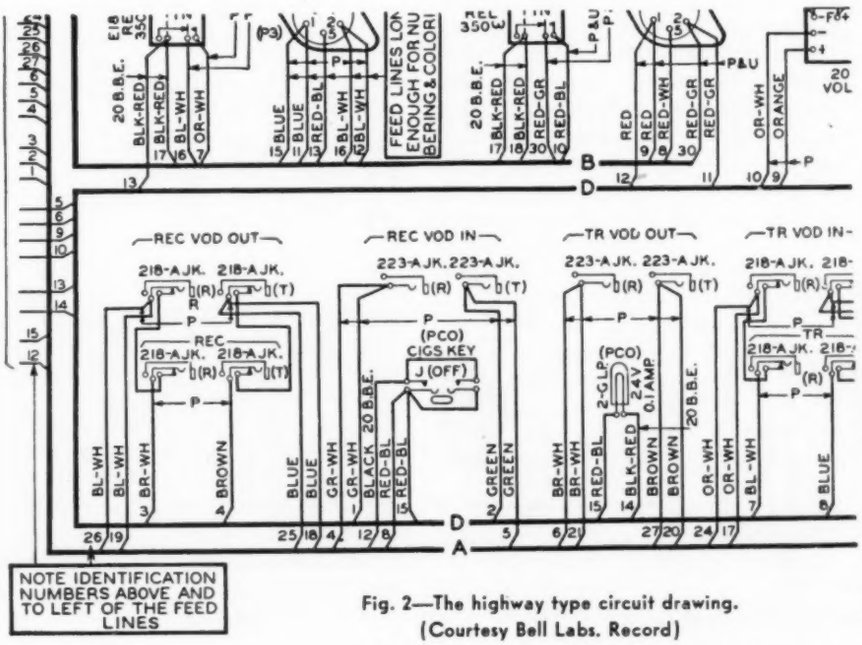


Fig. 2—The highway type circuit drawing.
(Courtesy Bell Labs. Record)

Telephone Engineer's RADIO COURSE FOR TELEPHONE MEN

CHAPTER 6---SECTION 2

Vacuum Tube Detectors and Amplifiers

By B. C. BURDEN
Technical Consultant
Lincoln, Nebraska

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A DETECTOR CIRCUIT, regardless of type, is purposely designed to distort the applied signal so as to separate the radio and audio frequency components. But an *amplifier circuit* is usually designed to pass, with minimum distortion, the signal applied to its input circuit. For example, a triode tube used as a plate circuit detector would carry a negative grid bias voltage of such value as to cause the tube to operate on the lower bend of its grid voltage-plate current curve. This means that the incoming signal would be rectified (distorted). In an amplifier a triode tube would be biased with a negative voltage sufficient to cause the tube to operate on the straight portion (Class A operation) of its characteristic curve thereby minimizing distortion. Typical amplifier terminology is illustrated by Fig. 80.

Action in Simple Triode Amplifier

FIGURE 81 illustrates the essential elements of a triode amplifying circuit. The negative bias voltage applied to the grid of the tube is of such value as to cause the tube to operate over the straight portion of its curve. Action is as follows: When the a-c voltage to be amplified is applied between the grid and cathode of the tube the normal grid voltage swings alternately, first in a positive (less negative) and then in a more negative direction. When the polarity of the half cycle of the impressed voltage is such as to cause the grid to become less negative, an increase in plate current takes place. When the impressed voltage is such as to cause the grid to become more negative, the plate current will decrease. These variations in plate current flowing through the primary winding of the output transformer induce an a.c. voltage in the secondary winding which is impressed on the receiving device or load.

Due to the fact that the grid element is located closer to the cathode than is the plate element the grid voltage variation is effective in producing an amplified voltage in the output circuit. This increase in voltage is often referred to in telephone practice as a "transmission gain."

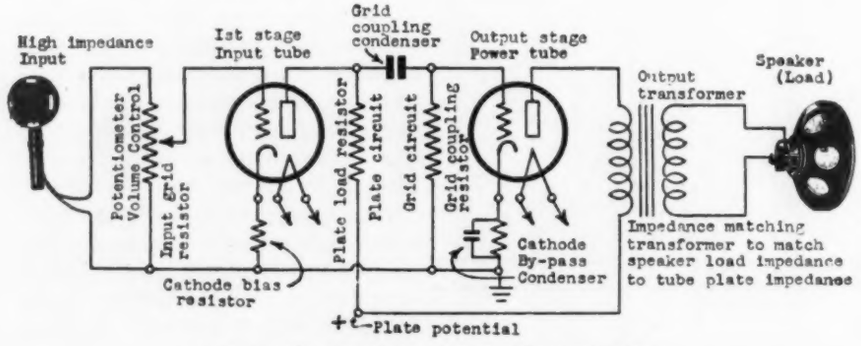


Fig. 80—Illustration of audio amplifier terminology.

Use of Graphs To Study Tube Action

A PROPER understanding of the action in a vacuum tube amplifier can be obtained by a study of the action with respect to the characteristic curve for the tube involved. As an illustration, assume that the amplifying circuit shown in Fig. 82 has an input of two volts (peak a-c) impressed on the grid circuit, with bias and plate voltages as shown. With no signal impressed on the grid the plate current for the particular tube shown would be approximately 8.0 milliamperes. With an a-c voltage whose peak value is two volts impressed on the grid the grid voltage will swing to a negative ten volts (-8.0 plus -2.0) dur-

ing negative half cycle, and to a negative six volts (8.0 plus + 2.0) during positive half cycles of the impressed input wave. Inasmuch as the plate current is governed by the grid voltage, it will faithfully follow the grid potential fluctuation and will increase from 8 milliamperes to 12 milliamperes during the half cycle when the grid is less negative and it will decrease from 8 milliamperes during the half cycle when the grid is made more negative. This action is shown graphically in Fig. 83. It should be noted that the grid input voltage causes a fluctuation in the plate current above and below the *operating point* established by the negative grid bias voltage of 8 volts. It should also be observed that the plate current output variations are a faithful reproduction of the grid input voltage variations.

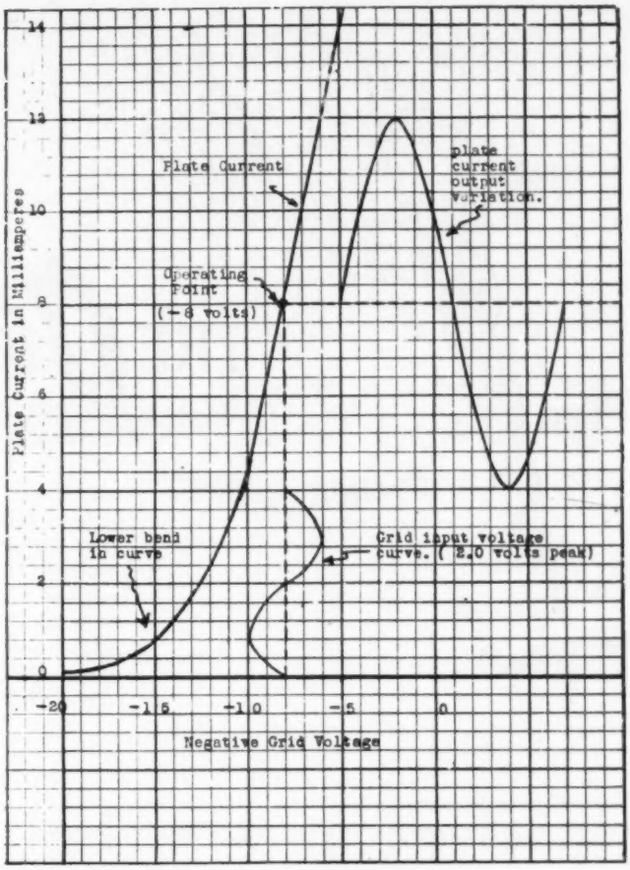


Fig. 83—Effect of grid voltage variations in plate current changes.

Distortion Due to Operation With Incorrect Bias Voltage

IF an audio amplifier is to faithfully reproduce in its plate circuit a replica of the input wave applied to the grid circuit, it is necessary that the grid bias voltage be of such value that the "swing" in the input voltage applied to the grid, be so limited that operation is on the straight portion of the characteristic curve. Should the grid bias voltage be too low or too high for the input voltage involved, distortion may occur due to the non-linear relationship between input voltage and plate current when the tube operates on the curved portion of the grid voltage-plate current curve.

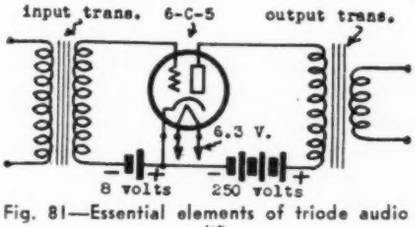


Fig. 81—Essential elements of triode audio amplifier.

Fig. 84 and 85 illustrates how distortion may take place due to the operation of a triode audio stage with an excessive negative bias voltage. It will be seen that if an input voltage of 5.0 volts (a-c peak) is applied to the grid of the tube, the plate current would decrease (on negative half cycles) to approximately

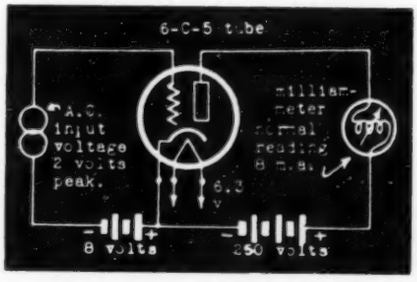


Fig. 82—Example of action in an audio amplifier stage.

0.8 milliamperes and increase to 4.4 millamperes on positive half cycles. Thus it can be seen that the amplified plate current (see Fig. 85) will be greatly distorted.

General Features of Amplifiers

VACUUM tube amplifiers can be classified in three general groups, with respect to general applications: (1) the *direct current amplifier,* (2) the *audio frequency amplifier* and (3) the *radio frequency amplifier.* Direct current amplifiers have limited application and are generally used in connection with photo cells, thermocouples and other similar direct current devices. Audio frequency amplifiers are used for applications involving frequencies ranging from a few cycles per second up to fifteen thousand cycles (or higher). Radio frequency amplifiers include any amplifier used on frequencies above the audible range. Actually, radio amplifiers can be further classified as the *carrier frequency type, and the intermediate frequency type.* However, for purposes of this discussion we will consider an amplifier designed for use at frequencies above the audible range as a radio frequency amplifier.

Class A and Class B Amplification

AFTER what has been said in the foregoing paragraphs it might be concluded that all audio amplifiers must be designed to operate over the straight portion of the grid voltage-plate current characteristic curves of the tubes used. This would be true if only a single tube were used, however, it is customary, in many cases, to use what is known as *Class B amplification.* This is an arrangement in which two tubes are connected in a *push-push* arrangement as shown in Fig. 86. In this type of amplifier the grids of the two tubes carry a negative bias voltage of such value that the plate currents of the tubes are approximately zero under the condition of no signal voltage applied to the grids.

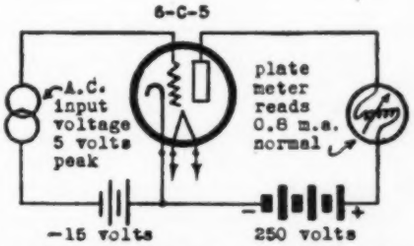


Fig. 84—Circuit showing use of excessive bias voltage in triode amplifier.

Plate current flows in either tube only during the half cycle when the a-c signal voltage applied to the grid of the tube causes it to "swing positive." Because two tubes are used, each tube operates essentially over the straight portion of its own characteristic curve

(Please turn to page 84)

Conducted by the
Observer and his Gang

THE Observation Tower

If you have observations or even a friendly bit of argument suitable for use in this column, you are invited to send them along, which automatically makes you a member of the Gang. You will be anonymous—no names of telephone people or telephone companies are used in this column. Address "The Observer," in care of TELEPHONE ENGINEER AND MANAGEMENT.

Who's Going Where?

THE greatest migration of U. S. residents in history has taken place, says the U. S. Census Bureau, since December, 1941. Twenty-seven million people, says the Bureau, left the places where they were living and went somewhere else; 15,300,000 of the movers were civilians; the remainder, members of or connected with the Armed Services.

We're wondering how much this mass migration had to do with the increased demands for telephone service at many places, and what effect it is going to have on the demand for telephones hereafter.

Many of the civilian migrants moved long distances, the Bureau says. Almost 8,000,000 of them crossed state lines. The West made a net gain in population of about 1,200,000; the South lost about 900,000 and the North about 300,000.

"Never before," the Bureau informs us, "has there been so great a shuffling and redistribution of the population in so short a time."

We opine that this shuffling and redistribution is not ended by any means. Now will come the "going back home" movement, and we think there'll be a lot of that.

It may be, of course, that when all the postwar redistribution is completed, we'll find the population back just about where it was before the war. We believe that if any parts of the country gain permanently from the wartime migrations, it will be the Far West and the South. And, if population in those areas gains permanently, telephone companies in those areas will gain stations permanently as a net result of wartime migrations.

Manufacturing Migrates, Too

ONE thing that may affect postwar population shifts is the fact that the war created a lot of new manufacturing areas. All kinds of things are being made in all kinds of places, where such things were never made before.

Take a look at the list of the big war plants that have employed many thousands of people during the war, and you'll be surprised to see some of the states and areas we have always looked upon as mostly agricultural—or at least as non-industrial—stepping into big time from a manufacturing standpoint.

There are, for instance, Kansas, Utah, Nevada, Nebraska, Louisiana, Oklahoma, Alabama and a number of others—including, of course, the newly industrialized Pacific Coast.

What's going to happen to a lot of this manufacturing, now that the war is ended? And what's going to happen to a lot of the telephones that were installed in those areas to meet the communications need of these big factories and the people who manned them?

That, of course, is something that only time can answer. It is, however, a practical certainty that something is going to happen to those big plants that were built and run solely for the purpose of making things that were good only for war purposes; the plants that made explosives, did bomb and shell loading, made aviation gasoline, and so on.

But, we think, there are many kinds of manufacturing, started in various places for war purposes, that will continue there in peacetime, either making the same or about the same things, or converted to make something else for peacetime use.

These plants will continue to employ people, of course, and, if the telephone company there is on the selling job, most of those people will have telephones. So some localities are bound to benefit from the wartime population shifts, even if they do so at the expense of other localities.

What's The Answer to These?

WE'VE recently been asked a couple of questions by people not in the telephone business. We don't know the answer to them—if you do, what is it?

One question is: "Why don't telephone companies print their exchange rates in their directories? They print long distance rates. Why not tell the would-be subscriber what it costs to have a telephone in the town? He might be under the delusion that the rate is higher than it really is, and that may be keeping him from applying for a telephone."

The best answer to this we can think of is the following: The publication of toll rates in directories was started

to encourage the use of the long distance lines. It has been continued, even during the shortage of long distance facilities, simply because it was the custom.

A few telephone companies do print their exchange rates in their directories, but such publication has never been a general custom. Why? Well, we don't know. It might be because companies sometimes change their local rates between directory issues.

But, says our questioner, toll rates also are sometimes changed between directory issues. So why don't telephone companies print their local rates in their directories, too?

We don't know. Do you? If so, tell us and we'll spread the news.

The other question is this: "Why don't telephone companies set up some sort of reciprocal arrangements between themselves so that when telephone facilities are short, an applicant for a telephone will have some preferential right, at any exchange, if he has been a telephone subscriber at some other exchange?"

Said this inquirer: "If I want my telephone moved from one location to another in the same exchange or the same exchange area, I get preferential attention. But if I move clear away from that exchange or exchange area and into another exchange or area, even though the telephones in my new location are operated by the same company, I am treated in the new area exactly as though I never had a telephone before. Why shouldn't my application for a telephone be treated, as to its preferential position, as a move, no matter where I go?"

We explained to this gentlemen that that system could not have worked during the war, because the purpose as to preferentials for telephone service then was to put the service where it was most essential from a war standpoint. We didn't explain to him why it wouldn't work or shouldn't be done in peacetime, because we're not sure that we know.

Probably the answer is that in peacetime there is usually plenty of telephone service for everybody, and preferentials are not needed.

If you know a better answer, let's have it, please!

Why Not Try Gas?

SPEAKING of questions. Gangster No. 196 has posed one for us that we hereby pass on to the inventive geniuses of the industry—it's another one we can't answer.

Why, asks this Gang Member, can't there be a sealed splicing chamber that can be applied to lead covered cable?

He puts it this way: He has a lot of cable splicing to do. Cable splicers seem to be non-existent at present. He has men that can do all he needs in cable splicing excepting the joint wiping job.

Now, says he, automobile people have developed ways of sealing an automobile cylinder against the high compression gas explosion, and any garage mechanic of average ability can do that job. So why can't some smart guy in the telephone industry develop a sealed cable splicing chamber?

We don't know why— but then we don't know how to splice cable, either. Maybe somebody knows how it could be done. Maybe, even, somebody has already done it.

If you know, pass it on to us and we'll pass it on to this Gangster—and also to the rest of the industry.

New Kinds of Telephone Businesses

GANG Member No. 197 tells us that he is worried because it looks like so many different kinds of industries are getting into the telephone business. Or, at least, that's the way it looks to him.

This Gangster explains that he has been reading and hearing about a lot of different kinds of businesses that are planning to set up their own two-way radio networks; Such as, for instance, bus companies that plan to equip their buses with two-way radio sets so the home office and each bus can keep in touch: taxicab companies that are planning the same setup, and so on.

Gang Member No. 197 thinks this kind of proposition would prove to be a lot more economic, and also more valuable to the businesses concerned, if the telephone companies supplied and maintained this apparatus, did the switching for such setups, and also gave each terminal—whether home office, bus or taxi, etc.—access to all the telephones in the telephone system.

There is nothing new about that idea, of course, and this Gangster admits that—some telephone companies have been developing this kind of service for a long time, and are now offering it, or preparing to offer it if proper frequencies can be obtained, to any kind of business that can make use of it.

What is bothering this Gangster is that he fears that, because some other telephone companies are not active on the proposition, there may grow up in their territories quite a number of radio telephone systems that are owned by the businesses using the service. He thinks the Independent telephone industry should get busy and figure out ways by which it can, itself, supply all this kind of telephone service that can be used in its territory.

A Postwar Balance Sheet

GANG Member No. 206 suggests that, now that the Postwar Era is here, somebody should make up a balance sheet of the Independent telephone industry as a whole for the purpose of ascertaining just what effects the war period had on it.

He points out that Independent telephone companies as a whole have more stations now than they ever had before, and have a relatively large number of applicants for service who still want telephones. Independent companies also, he says, have more cash on hand than they ever had before. Against that they probably owe more taxes than they ever owed before.

They have, he mentions, a higher level of toll revenue than they ever had before. Against that is the likelihood that toll income will be lower after the cessation of many activities caused by the war—such as the large troop movement still going on, etc.

The labor and wage situation has changed considerably, he says, as the result of war conditions. The telephone rate situation has not yet changed much, but he thinks there will have to be many local rate increases for the purpose of carrying higher expenses of one kind or another, now integrated into the business, that were brought about by the war.

He thinks a lot of telephone plants will have to be overhauled, and the makeshift construction that had to be carried on in many places because of the shortage of men and materials, will have to be replaced with more orthodox plant.

He thinks there should be somebody in the industry who is smart enough to add up all the good things and put them down on one side of a balance sheet, and the bad things and put them on the other side, to make up a balance sheet of the industry as it is now, and as it was before it was affected by the war.

Well, we think, too, that there should be somebody in the industry smart enough to do this—but we know we're not that smart. So we hereby refer the proposition to the figuring sharps who like to deal with statistics and to draw conclusions from them. Go to it!

★ *Special Issue Feature*

RESTORE and IMPROVE

TERMINATION of World War II on August 15 marked the top of the hill for Independent plant managers throughout the country. After months of handicaps due to inadequate help, WPB restrictions and severe material shortages, the plant manager is at last able to see better days ahead. In spite of these handicaps, telephone service has suffered but little and traffic loads far above normal have, in most cases, been handled with dispatch and efficiency. However, the physical plants have sustantially deteriorated and in many cases, are in need of complete rehabilitation. The need for major repairs and reconstruction in many exchanges makes this an ideal time for exchange managers to introduce new and improved construction practices and to throw overboard obsolete and inefficient methods which adversely affect both service and net earnings. This article discusses miscellaneous plant construction practices which have proven worthy of standardization in the Independent field and suggests that those companies not now following these practices consider their adoption.

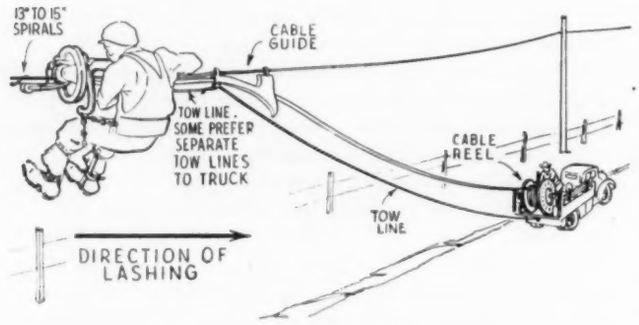


Fig. 1—Placing and lashing cable direct from the cable reel.

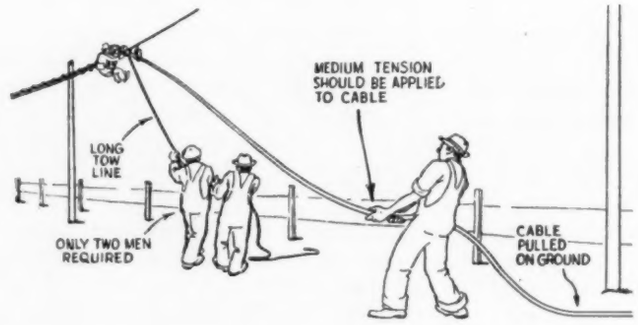


Fig. 2—Placing and lashing cable pulled out on the ground.

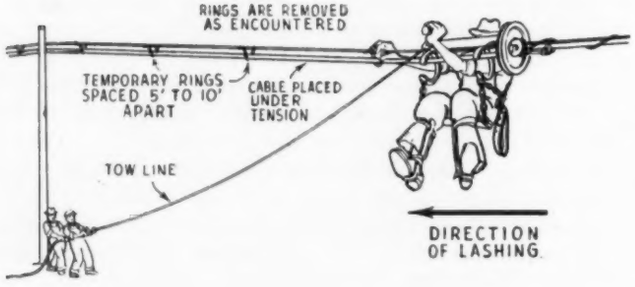

RINGS ARE REMOVED AS ENCOUNTERED
TEMPORARY RINGS SPACED 5' TO 10' APART
CABLE PLACED UNDER TENSION
TOW LINE
DIRECTION OF LASHING

Fig. 3—Lashing cable placed in temporary rings.

Cable Plant

THE lashed method of cable suspension has been in use for a number of years and is now standard practice with most of the larger and many of the smaller companies. Cable lashed to the suspension strand by means of a spinner machine shows lower initial construction costs and substantially longer life characteristics than cable suspended in rings. It has been estimated that savings of 20 to 30% in material costs are possible by the use of the spinner method. Man-hour requirements for placing lashed cable range from 10 to 30 hours per thousand feet.

Three methods are in use for placing cable by the spinner method. These three methods are illustrated by Figs. 1, 2 and 3. Method No. 1 is the most popular where it can be used.

A new "pull type" cable spinner machine which is now available does away with the spinner operator as the spinner is pulled from pole to pole by men on the ground using a tow line. One of the new "pull type" machines is shown in Fig. 4.

Termination of Lashing Wire at Pole

VARIOUS practices are in use for terminating lashing wire at the poles. One method consists in the use of a lead shield as shown in Fig. 5. Another practice is to use zinc cable straps as shown in Fig. 6. Opinion seems somewhat divided as to which of the two methods is most satisfactory.

Lashing Cable by Hand

WHEN only a few thousand feet of cable are to be placed and a spinner is not available, cable can be successfully lashed by hand as is shown in Fig. 7. Two men are required; one to spin the lashing wire around the cable and strand and the other to space the spirals evenly and pull the cable tightly against the strand. It has been estimated that the labor requirement for the hand method is 20 to 30% greater than when a machine is used.

Table No. 1—*Basic Data for Long Span Construction For 109—High Tensile Strength Iron Wire*

Loading Area	Pole Length and Class	Span Length	Foles per Mile	Crossarm
Light	16′ — 9	330	16	16 pin
	16′ — 10	440	12	2, 4, 6 pin
Medium	16′ — 9	440	12	10 pin
	16′ — 10	440	12	2, 4, 6 pin
Heavy	16′ — 10	330	16	2, 4 pin
	16′ — 9	330	16	6 pin
	16′ — 7	330	16	10 pin

Buried Cable

THE availability of jute protected and steel armored exchange cable makes possible successful buried cable construction where conditions are suitable for this type of construction. The feasibility of a complete underground exchange cable plant has not yet been proven. The complications and costs introduced by the need for frequent terminals in city plants make it difficult to "prove-in" buried cable. However, it can be used to good advantage for long runs of rural and toll entrance cable. When "narrow type" trenching machines are available and trenching costs are relatively low, the use of jute or tape armored cable is at least worthy of consideration.

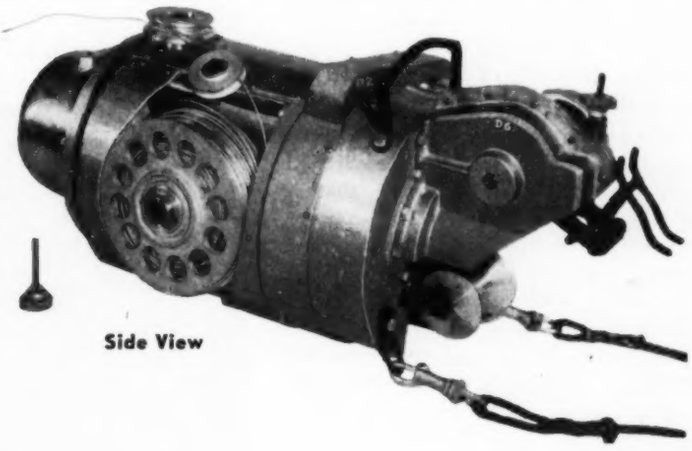


Fig. 4—New pull type spinner (courtesy Cable Spinning Company).

Cable Maintenance

IN considering ways and means for improving cable maintenance practices telephone managers should not overlook the possibilities present in truck mounted ladders (see Fig. 8). Most aerial cable leads are located at the edge of streets or alleys and permit a truck mounted ladder with crows nest to be used efficiently. This arrangement has the advantage of permitting all but major cable repairs to be made without the necessity of erecting a cable platform or riding the cable. It is of particular value in permitting the quick and easy inspection of cable and the making of minor repairs with-

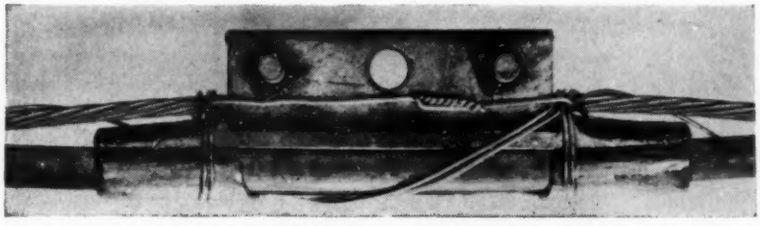


Fig. 5—Use of Lead Shield and binder wire at poles.

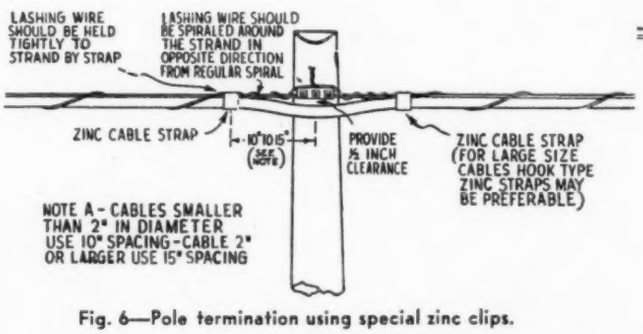

LASHING WIRE SHOULD BE HELD TIGHTLY TO STRAND BY STRAP
LASHING WIRE SHOULD BE SPIRALED AROUND THE STRAND IN OPPOSITE DIRECTION FROM REGULAR SPIRAL
ZINC CABLE STRAP
10" 10 15" (SEE NOTE)
PROVIDE ½ INCH CLEARANCE
ZINC CABLE STRAP (FOR LARGE SIZE CABLES HOOK TYPE ZINC STRAPS MAY BE PREFERABLE)
NOTE A - CABLES SMALLER THAN 2" IN DIAMETER USE 10" SPACING - CABLE 2" OR LARGER USE 15" SPACING

Fig. 6—Pole termination using special zinc clips.

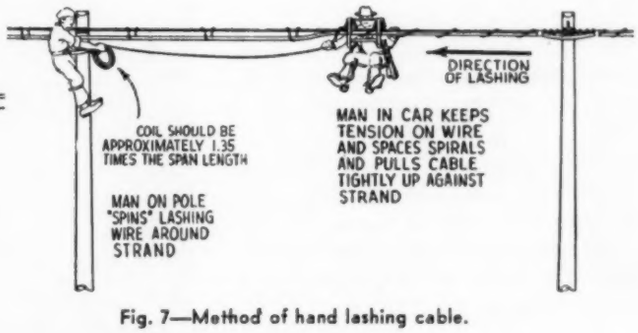

DIRECTION OF LASHING
COIL SHOULD BE APPROXIMATELY 1.35 TIMES THE SPAN LENGTH
MAN IN CAR KEEPS TENSION ON WIRE AND SPACES SPIRALS AND PULLS CABLE TIGHTLY UP AGAINST STRAND
MAN ON POLE "SPINS" LASHING WIRE AROUND STRAND

Fig. 7—Method of hand lashing cable.

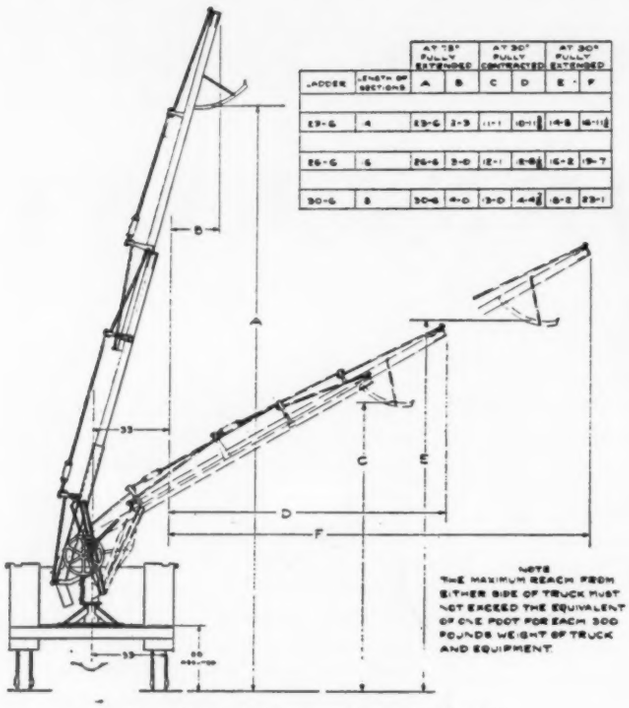


Fig. 8(a)—Detail of truck mounted ladder.

Fig. 9(a)—Modern construction truck. (Courtesy Highway Trailer Company).

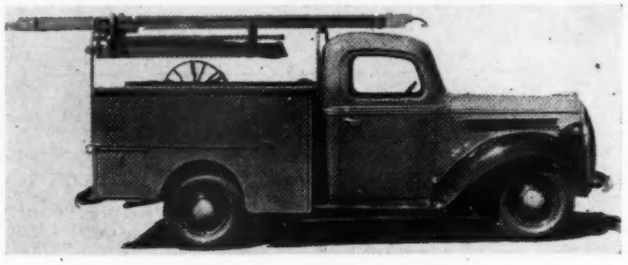


Fig. 9(b)—Rural line maintenance truck. (Courtesy American Coach & Body Co.)

Fig. 8(b)—Use of truck mounted ladder for cable maintenance work.
Photo by G. H. Rowe

out the necessity of riding the strand in a cable car.

Companies that are using truck mounted ladders for cable inspection and repair purposes estimate that it will save 30 to 50% of the labor hours normally required for this work, and that the use of the ladder will result in a much better grade of cable maintenance. The truck mounted ladder is also useful for general tree trimming purposes, and working on open wire lines.

Pole Line

WARTIME pole and labor shortages have resulted in considerable deferred pole line maintenance. With major pole replacements in prospect, an opportunity is offered to consider the desirability of rerouting leads which are not on the best routes and for eliminating numerous road jumps which may no longer be necessary or desirable. Newly constructed leads can be laid out on a line which is sufficiently far from the road center so as to avoid the necessity for an early pole line move due to road widening operations when the proposed national highway improvement program gets under way.

Before major pole line work is undertaken, state and county officials should be consulted with reference to their plans for road changes and widening projects. Every effort should be made

(Please turn to page 70)

NEWS Briefs...

FCC On 5-Day Week

In line with the reduced tempo of Washington affairs, now that the war strains are over, the FCC recently decided to embark upon a five-day work week. The Commission offices are to be open only from Monday to Friday between 9:15 a. m. to 5:45 p.m. (EWT.)

Assistance on Rate Data

H. W. Hubenthal, secretary of the Oklahoma Telephone Association, has advised members of that association that the solution to most telephone company problems is more remuneration through an upward readjustment of rates. In urging the members to try to improve their company's financial condition by asking for revisions of rates, the association offers to assist in preparing the supporting testimony for the claims for higher rates. The association should be supplied with the following statistical information, and forms will be supplied upon request:

1. The number of stations served, classified according to business, residence, rural owned and switched telephones.
2. Present rates, rental revenue and proposed rates.
3. A statement showing in detail prewar and present operating expenses.
4. Total amount of investment in plant and equipment useful and service.

Of greatest assistance and therefore most desired for proving claims for more revenue is information showing in detail the increase in cost of labor, taxes, materials and supplies over prewar costs.

FCC Authorizes Four Toll Construction Projects

Four telephone toll construction projects, totaling an estimated $1,640,000 which are part of the Bell System's postwar program, received FCC approval Sept. 4.

One of them was for the Southwestern Bell and the American Telephone and Telegraph Co. for $436,000 between Kansas City and Hutchinson and Wichita, Kansas, which provided three new Type K carrier systems with a total additional capacity of 36 telephone channels. The other three construction plans were those of the New England Telephone and Telegraph Company in Maine and New Hampshire.

Increased Rates; Conversion to Dial

The Carolina Tel. & Tel. Company of Tarboro, N. C. put into effect at its Jacksonville exchange September 1 an increase in rates, granted by the North Carolina Utilities Commission. Although Carolina Tel. & Tel. requested the following rates, the commission felt that the proposed rates were excessive.

	Rates Proposed Per Month	Rates Granted Per Month
Business, Individual Line..	$4.00	$3.75
Business, Two Party Line..	3.50	3.25
Residence, Individual Line.	2.75	2.50
Residence, Two Party Line.	1.75	1.75
Residence, Four Party Line	1.50	1.50
Residence, Extension	.75	.75

Also the company was authorized to convert its exchanges at Colerain from magneto and Nashville from common battery to automatic dial types as early as practicable and to put into effect the following new rates at both exchanges upon inauguration of dial:

Business, Individual Line,	$3.25 per month
Business, Two Party Line,	2.75 per month
Business, Extensions,	1.00 per month
Residence, Individual Line,	2.00 per month
Residence, Two Party Line,	1.50 per month
Residence, Extensions,	.75 per month

Luther W. Hill, who was the only witness for the company before the commission, is president of Carolina Tel. & Tel. and John R. Porter, whose article on management appeared in the May TELEPHONE ENGINEER & MANAGEMENT, is chairman of the board of directors of the company.

Granted 20-year Franchise

The Central West Telephone Company, of Estelline, S. D., were voted a 20-year franchise by the people of that city at a recent special election.

The company is making plans for extensive improvement in the system, both in town and throughout the country, and if plans materialize, (and they should, now that the war has come to an end) cable will be laid underground and a dial system installed, thus giving Estelline and surrounding country a modern telephone system.

State Association Conventions

The first state convention to be resumed of which we have been informed is the Virginia Independent Telephone Association annual meeting at Hotel Roanoke, Va., on October 25 and 86.

Virginia and Tennessee Probe Utilities Tax Assessments

Taxation of public utilities, properties, including the telephone and telegraph real estate, is a live political subject in both Tennessee and Virginia and the governments of both states have launched strong movements for increased valuations for tax purposes.

The assessment of Virginia real estate owned by utilities at 40 percent of real value in contrast to realty owned by corporations and individuals being assessed at 100 percent was an issue in last week's Democratic gubernatorial contest. Governor Colgate W. Darden declared during the campaign that he could see "no excuse" for the existing policy of assessing utility-owned real estate at 40 percent of value and promised a thorough study by the state legislature which convenes in January.

The Tennessee Railroad and Public Utilities Commission started hearings Aug. 16 on its recent order of an overall increase of more than one-third in the assessments of privately-owned utility companies, exempting the TVA. This increase aggregating more than $85,000,000, will be protested by the utilities before the Commission. It is charged that the Commission is dominated by Memphis political boss Crump and some newspapers in the state claim he is trying to shift the burden of cities' taxation entirely to the utilities.

★ *Special Issue Feature*

Auxiliary SIGNALS and DEVICES for Added Income

By J. S. REED, JR.

THE primary aim of a telephone company is to furnish exchange and toll connections for subscribers' telephones at rates that will assure the company of at least a fair return on its investment. Many times, however, this return is rather meager and the management must cast about for other means to bolster its net earnings. One satisfactory way is for the company to furnish special services to its subscribers through the leasing of auxiliary equipment.

There is a wide variety of uses for special services such as auxiliary signals and devices. Types of auxiliary units discussed in this article are audible or visual signals operated in several different ways according to the desire or need of the subscriber: chime signals, switching keys, buzzer systems, voice recording equipment, and deaf set amplifiers.

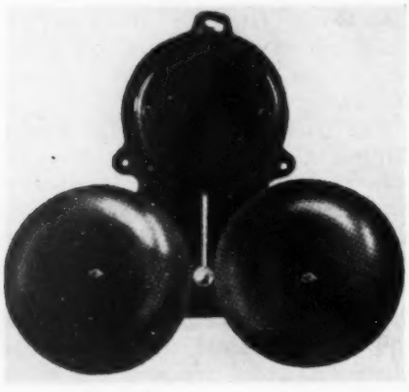


Fig. 1—Typical loud ringing extension gong suitable for conditions of light exposure.

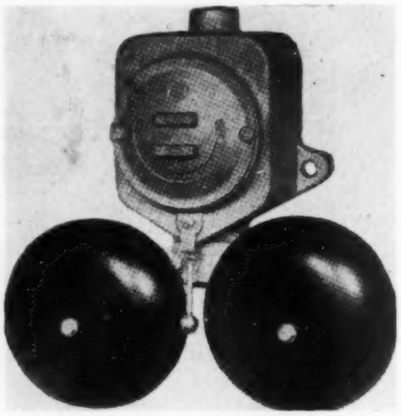


Fig. 2—A loud ringing extension gong of the waterproof type designed for conditions of severe exposure. (Courtesy Automatic Electric.)

A monthly rate can be charged for these services without in any way affecting the rate schedule set up for standard exchange and toll services. Typical rate charges would be as follows:

Loud ringing extension gong..$0.50 per mo.
Signal control equipment ..... 1.00 " "
Visual lamp signals (neon type)..... 0.25 " "
Chime Signals .... 0.50 " "
Switching Keys ... 0.50 to 1.00 per mo.*
Buzzers or push-buttons (each) .. 0.10 per mo.
Deaf set amplifiers 2.00 " "

*Depending on number of lines to be switched.

Auxiliary Signals

THE subscriber's station may be provided with loud ringing gongs, or control equipment for horns, single-stroke or vibrating gongs of any size, visual lamp signals, and the like. The control equipment may be designed to operate only during the ringing intervals or to operate continuously from

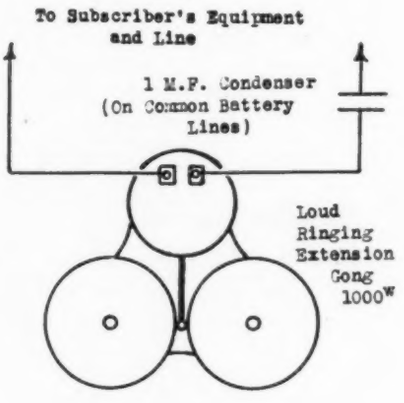


Fig. 3—Method of connecting loud ringing extension gong to telephone line.

the moment it is tripped until the subscriber answers the telephone. The choice of the proper type of signal should depend on how much its tone contrasts with the noise to be overcome rather than on how much louder it is.

Loud Ringing Extension Gongs

THE loud ringing extension gong is designed for use where an ordinary extension ringer would have inadequate volume for certain applications such as in garages, warehouses, lumber yards, shops and railroads.

Figure 1 illustrates a popular type of loud ringing gong intended for indoor use and for outdoor locations where the gong is reasonably protected from the weather. Figure 2 is a waterproof type of loud ringing gong designed for locations of severe exposure. Both utilize ringers of the polarized type for operation on exchange ringing current and have six or eight inch gongs. Figure 3 shows how these units are connected to the subscriber's line.

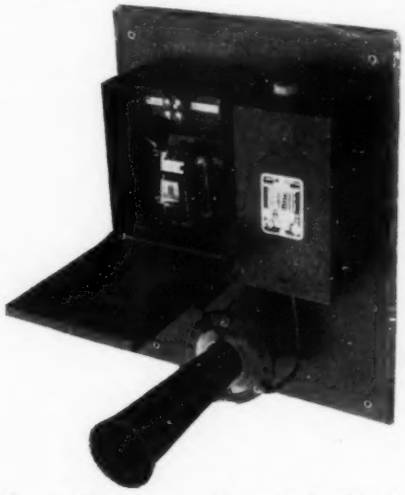


Fig. 4—Horn type with control relay in cabinet (open view) and transformer for signal power.

Control Equipment for Auxiliary Signals

WHEN more powerful or more effective signals are needed than can be produced by loud ringing gongs, it is necessary to provide control equipment to trip these signals since the exchange ringing current alone is not sufficiently strong to operate them. This control equipment consists of an a-c relay that is energized by ringing current. Closing of the relay contacts starts the signal. The signal itself may be a Klaxon horn, siren, single stroke gong, chime, or visual signal lamp. The source of current for the signal may be 110 volts from commercial a-c supply, 24 volts from the exchange battery, or 8 to 24 volts from a step-down transformer. The relay should be of a type that will operate on alternating current as well as on direct current and that is sufficiently rugged to stand the applied voltage and the current drain of the signal. Telephone type relays are necessarily limited to 25 watts at 50 volts a-c, though relays are available that can handle up to 400 watts at 150 volts a-c.

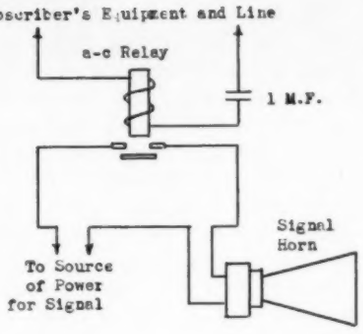


Fig. 5—Non-locking control equipment for signal apparatus.

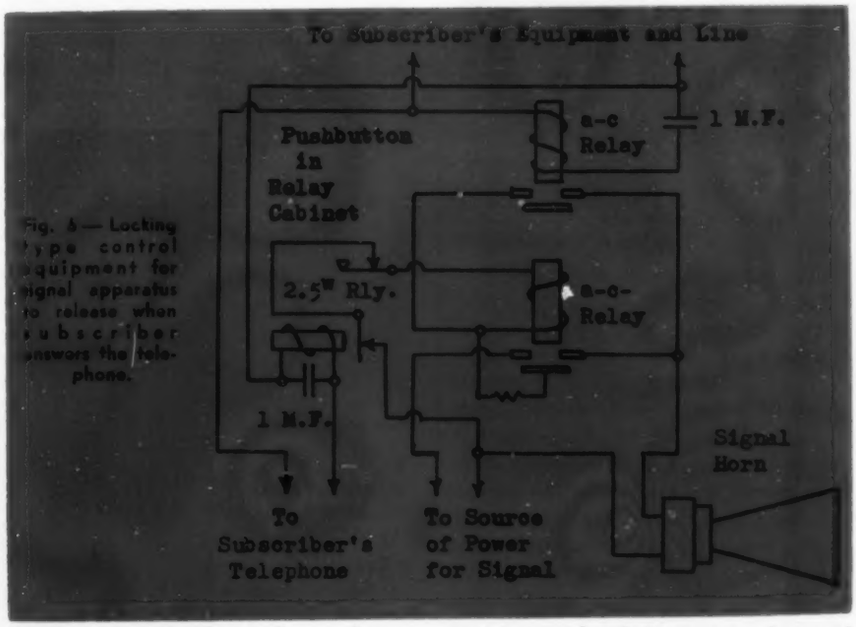


Fig. 6—Locking type control equipment for signal apparatus to release when subscriber answers the telephone.

Auxiliary Signals

FIGURE 4 shows a signal horn mounted on a cabinet containing control equipment for operating the horn The circuit diagram for a non-locking signal system is given in Figure 5. When the subscriber desires a steady signal, the circuit diagram in Figure 6 may be used to lock the signal as soon as ringing current comes in over the subscriber's line.

When the locking arrangement is utilized, means for releasing the signal must be provided. This usually takes the form of a pushbutton in the control equipment cabinet together with an external push button or a relay operated by the battery current flowing over the line when the subscriber lifts the receiver to answer.

Visual Lamp Signals

IN certain locations it may be desirable to utilize lamp signals in place of audible signals. Such locations may be the consulting rooms of doctors' offices, libraries, quiet sections in hospitals, and places where selection reports and the like are being received over several telephones for tabulating purposes.

For most of these applications ¼ watt neon signal lamps can be used directly across the incoming line without the need for a relay and a local supply for the signal. They respond only during the ringing intervals but have a high degree of visibility under most lighting conditions.

Figure 7 illustrates a desk type lamp signal that is intended for locating on a desk or table where it will be readily visible to the subscriber. This unit houses a low voltage lamp lighted from dry cells or a bell ringing transformer in series with a capacitor and an a-c relay operated by the ringing current. This visual signal may replace a bell box or be used in conjunction with an audible signal to indicate on which of two lines a call is coming.

In another application, this type of signal may be used to indicate when a telephone in a station switching setup is in use. In this case, a d-c relay in series with the line is utilized. The lamp lights when the relay is energized by battery current flowing in the line and indicates that the telephone is busy.

Fig. 7—Desk type visual lamp signal. (Courtesy Automatic Electric)

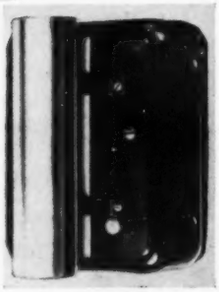


Fig. 8—The monochime signal. (Courtesy Automatic Electric)

Chime Signals

FOR subscribers who prefer a more pleasing and distinctive tone than that produced by an ordinary polarized bell, chime signals are available. The chime signal strikes a single musical note that is repeated at the beginning of each ringing interval. This type of signal is particularly suited for hospitals, banks, offices and homes.

The signal unit is a chime bar mounted in close proximity to a metal cylinder that acts as a resonator. A plunger actuated by a solenoid strikes the chime bar each time the solenoid is energized by ringing current and the resonator reinforces the sound, producing a clear, mellow tone.

Figure 8 illustrates a type of chime that is incorporated in a bakelite case with standard induction coil and condensers so that this unit can be used in place of a regular polarized ringer box.

Figure 9 shows another type of chime signal designed to produce two alternate tones, one high and one low. Two resonators, one above and one below the solenoid are adjusted so that one produces a certain tone when the solenoid is energized and the other a different tone when the plunger falls back on the solenoid being de-energized. Figure 10 shows the wiring diagram of this type of chime signal.

The resonators are adjustable to produce two high or two low tones instead of an alternate high-pitch and low-pitch sound. This feature can be utilized to advantage in locations where it is desired to distinguish between the signals produced by two or more bell boxes placed close together. One of the bell boxes may contain a standard polarized ringer and the other sets may be chime signal boxes with the desired adjustments of resonators in each.

Switching Keys—Station Key Sets

IN business or professional firms, it has been found that business contacts can be more efficiently made when the executive or professional man has access to two or more lines via his telephone. To provide him with this type of service, without the need for a private branch exchange scheme, switching keys may be installed to enable him to make or receive calls on one or the other line at will.

The switching key may be in an individual case as illustrated in Figure 11, or it may be incorporated in the telephone instrument itself as shown in Figure 12, a sub-base on the instrument being used for this purpose.

Switching keys may be two-, three- or four- way according to the number of lines or circuits connected. Figure 13 illustrates the wiring diagram of a typical three-way key. Keys of this type usually do not provide for holding a call on one line while conversing on another.

A common arrangement in which a switching key is utilized is that in which telephones on adjacent desks or in other rooms can be answered by an office girl when the occupant is absent. A call on one telephone may be transferred to another telephone by means of the switching key if desired. This arrangement is shown in Figure 14.

An arrangement in which station key sets are utilized is shown in Figure 15. This is particularly suited to cases where an executive or professional man has a private office with his secretary in an adjoining room. The secretary answers all calls and extends important ones to the executive. This prevents frequent interruption of the executive's work to answer inconsequential calls.

Such an arrangement makes use of an inter-communicating circuit for the use of the secretary and the executive only and a line to the central office that can be used by either the secre-

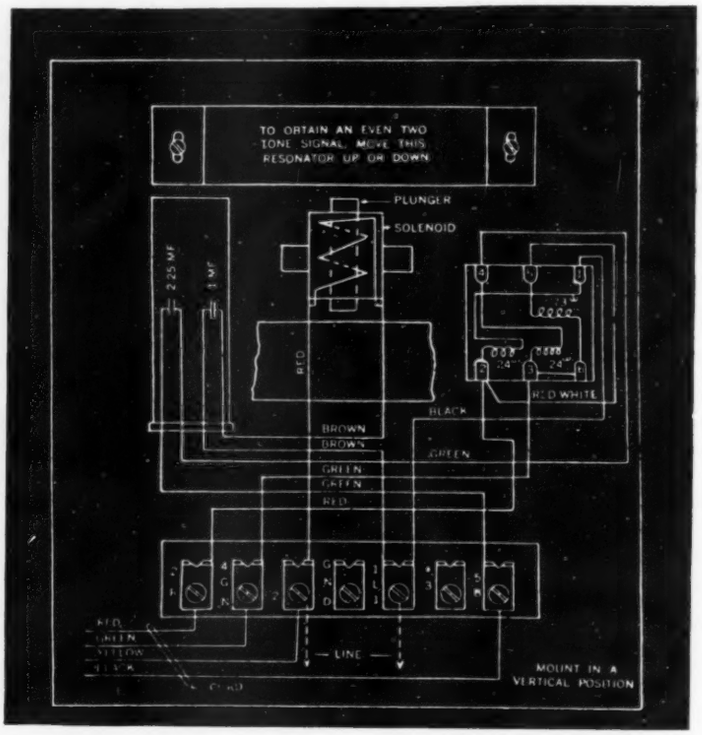


Fig. 10—Wiring diagram of chime signal box.

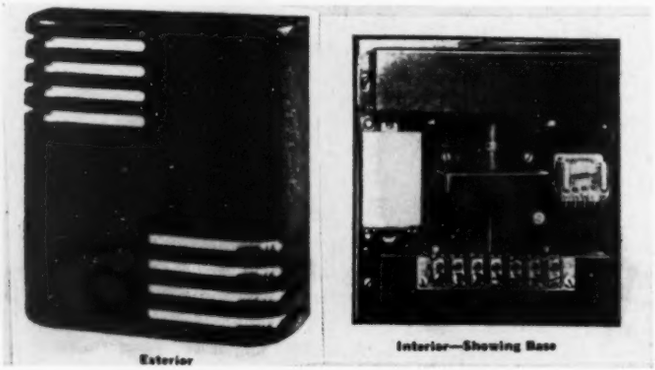


Fig. 9—Chime signal box—Exterior and interior views. (Courtesy Stromberg-Carlson)

Fig. 11—External appearance of a typical switching key.

Fig. 12—The "Two-Line" Monophone designed for switching on two lines and holding on one or the other line. (Courtesy Automatic Electric)

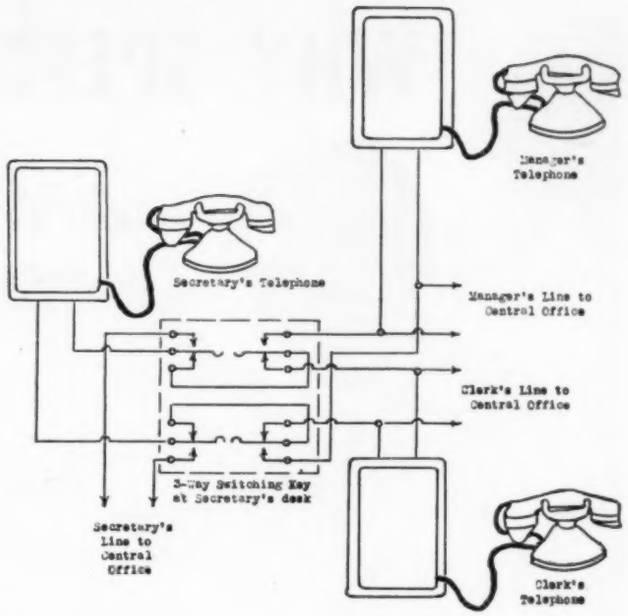


Fig. 14—Use of switching key for answering calls at telephones located at other desks or in other rooms and for transferring calls.

tary or the executive as desired. The station set has a holding key by means of which a call on the central office line may be held while the secretary converses with the executive. A buzzer circuit is needed to enable the secretary or executive to signal one another. Figure 13 shows the buzzer circuit used in this system.

The foregoing system is only typical of the many schemes that can be devised to facilitate service to business and professional subscribers. The telephone needs of any group of executives up to three with a secretary can be served in this manner.

Fig. 13(a)—A side-mounting handset telephone with switching key.

Buzzer Circuits

BUZZER circuits are generally used for station signalling in key type stations. Sometimes the subscriber furnishes his own pushbutton, buzzer, and necessary wiring, but usually it is more satisfactory for the busy executive to have the telephone company install and maintain the buzzer system.

Sources of power for operating the buzzers are dry cells and bell ringing transformers. Less trouble is experienced when a bell ringing transformer is utilized for this purpose rather than dry cells which require replacement from time to time.

Figure 16 illustrates the various methods of connecting buzzers and pushbuttons to meet the requirements of subscribers.

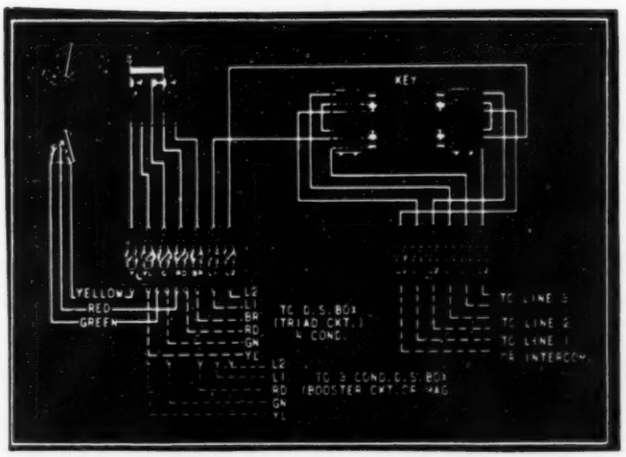


Fig. 13(b)—Circuit diagram of set and switching key arranged for three-way switching. (Courtesy Kellogg Switchboard)

The Peatrophone Voice Recording Unit

FOR the past few years telephone companies have been furnishing what is known as the secretarial service, whereby calls to an absent subscriber are intercepted by a special operator who tells the caller where the subscriber may be found or when he will return and, if desired, takes down a message. Although this service has been in successful use in the larger exchanges for a number of years, it has not been found practical in small and medium-size exchanges because of the small demand in these localities and the expensive equipment and personnel necessary to furnish this type of service.

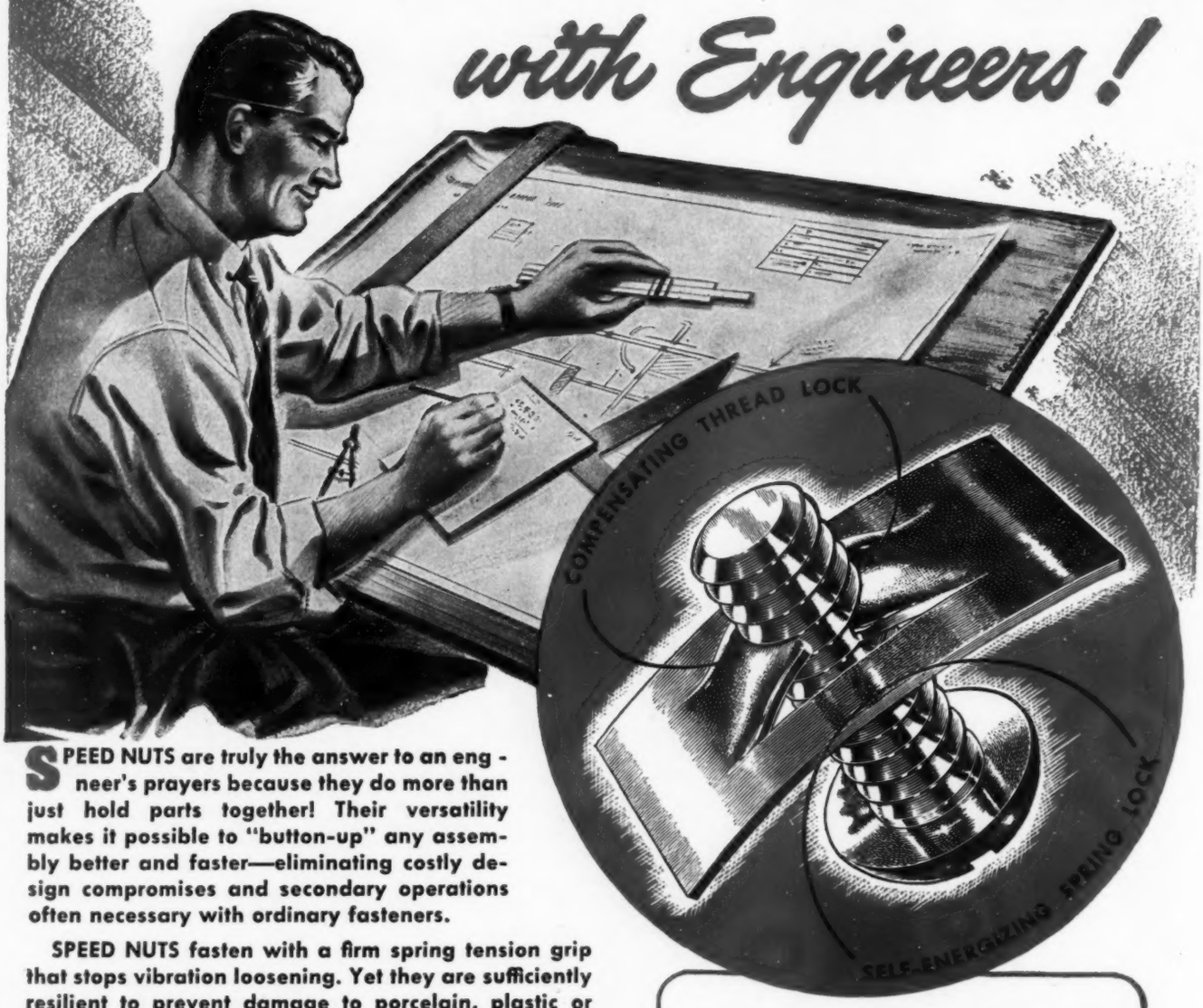
A mechanical counterpart of the secretarial operator, however, is available to render the same type of service to subscribers who need to leave their telephone unattended at times but desire callers to be informed of their absence and to record their messages. This device is a voice recording unit known as the *Peatrophone* illustrated in Figure 17.

The Peatrophone incorporates two phonograph mechanisms arranged to operate alternately, one to give the subscriber's message to callers and the other to record the caller's message.

When the subscriber leaves the telephone, he pushes an arm, connected to the unit, down on the cradle switch of his handset telephone and fits the handpiece into a receptacle provided in the case of the Peatrophone. That part of the receptacle into which the receiver

(Please turn to page 94)

WHY SPEED NUTS ARE FIRST *with Engineers!*



SPEED NUTS are truly the answer to an engineer's prayers because they do more than just hold parts together! Their versatility makes it possible to "button-up" any assembly better and faster—eliminating costly design compromises and secondary operations often necessary with ordinary fasteners.

SPEED NUTS fasten with a firm spring tension grip that stops vibration loosening. Yet they are sufficiently resilient to prevent damage to porcelain, plastic or glass. Some SPEED NUTS are self-retaining, thus eliminating expensive welding, riveting or clinching. They compensate for a wider range of commercial tolerances or misalignment. Having no threads, they cannot "freeze" to bolts or screws . . . a mighty important point in servicing or repairing your product.

Chances are, you'll be able to find the RIGHT fasteners among more than 3000 shapes and sizes in the SPEED NUT line. If not, we can come up with new ones specially designed for your particular needs. In either case, SPEED NUTS will improve your post-war products and reduce your net assembly costs. Send in your fastening specifications for analysis . . . TODAY!

NOTHING LOCKS LIKE A SPEED NUT

Only SPEED NUTS provide a COMPENSATING thread lock and a SELF-ENERGIZING spring lock. As the screw is tightened the two arched prongs move inward to lock against the root of the screw thread. These free-acting prongs COMPENSATE for tolerance variations. Compression of the arch in prongs and base creates a SELF-ENERGIZING spring lock. These two forces combine to definitely prevent vibration loosening.

TINNERMAN PRODUCTS, INC., 2017 Fulton Road, Cleveland 13, Ohio

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario

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Speed Nuts

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FASTEST THING IN FASTENINGS . . . OVER 3000 SHAPES AND SIZES

COOK TYPE UX

Cable Terminal

Designed to facilitate installation and service in manhole termination and distribution of underground cable systems, the Type UX Cable Terminal (unprotected) combines many features which have made it popular with telephone men everywhere.

The lateral cable enters through a well in the cable chamber into which solder is puddled so that a strong, moisture-proof connection is made. A patented metal strap on the mounting bracket clamps the cable to prevent injury to the cable at the joint between the cable and terminal. The terminal may be mounted with cable stub out of top or bottom.

The terminal provides for service outlets. These outlets in the sides of the terminal are sealed with a brass pipe plug having a 3/8" pipe thread. Lead sheath of instrument distribution cables are terminated in heavy brass stuffing boxes set in the service outlets. The face plate is made of a single piece of moulded bakelite of great strength, low moisture absorption, and high electrical resistance under all conditions.

COOK ELECTRIC Company

Telephone Protection & Distribution Engineering Since 1897

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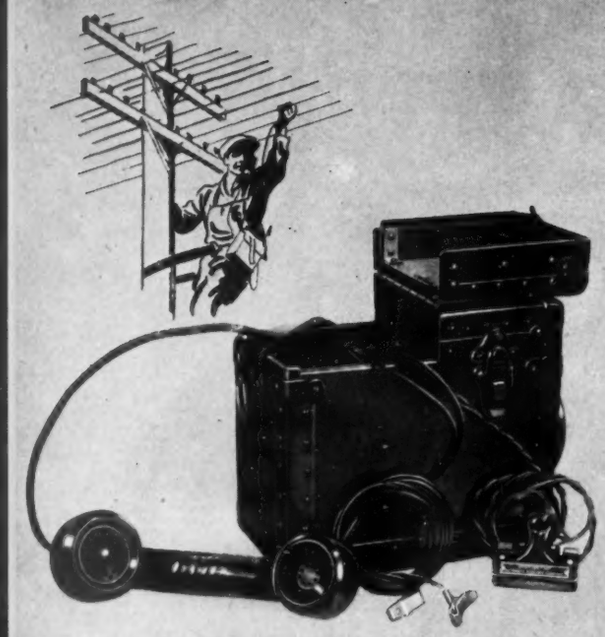
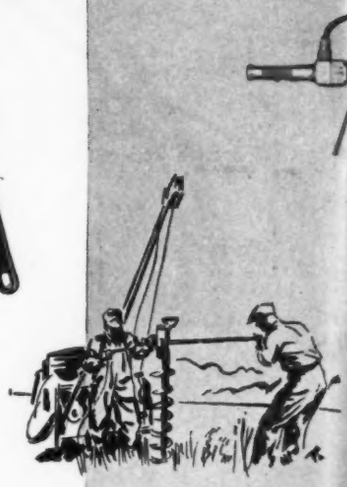


WEST TEST SET
The quick, scientific short-cut for locating grounds, shorts, opens, arrester faults and "high" joints A "one-man" trouble-shooter.

COFFING HOIST
Lightweight construction—easily carried up a pole, for pulling wire, messengers, etc. Enables one man to lift or pull more than a ton!



These Tools Save Manpower... Lower Construction Costs!

"MANSAVERS", you might call them, because these husky tools enable one or two men to do the work that otherwise requires more. They save time, and cut out much of the hardest labor in plant construction and maintenance.

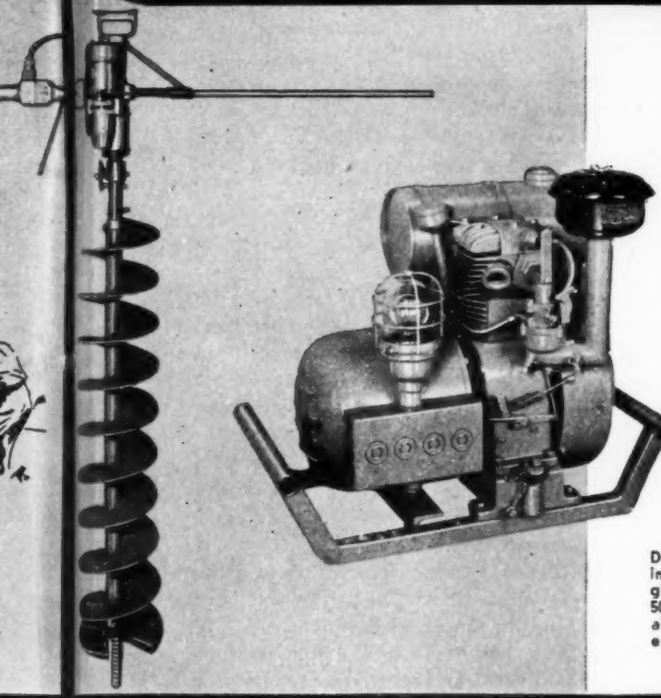
These tools can quickly pay for themselves in lowered construction costs. Look them over here—and order ***now*** from your Automatic Electric Supply Catalog.

CAPSTAN PULLEY BLOCK
An old favorite tool for attaching guys, raising and placing poles, pulling cable, and general use in line construction.

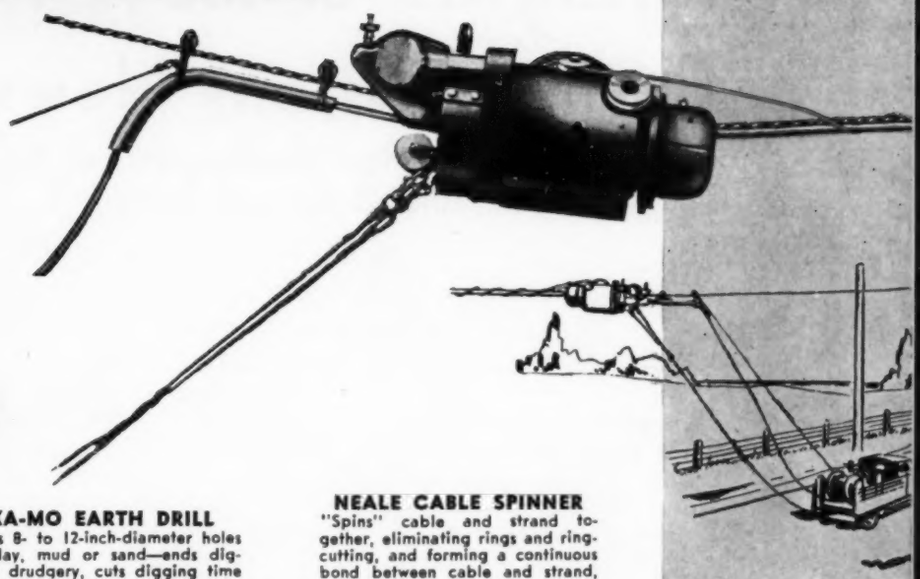
LOG CHAIN
Fourteen-foot chain, with grab-hook at one end, slip-hook at other end. A safe, dependable hitch for heavy lifting or towing.

CROW AND DIGGI ARS
Octagon bars made of spec by heat-treated tool steel. Double ed cutting blade at one end, t other end.

THESE TWO ARE NEW, TOO!

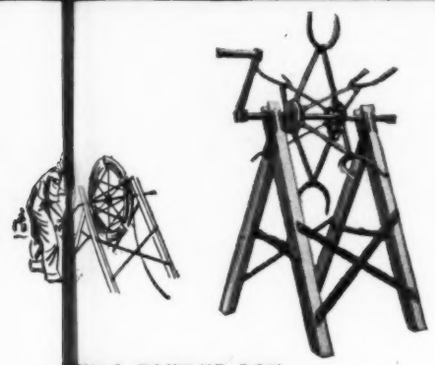


KA-MO EARTH DRILL
Drills 8- to 12-inch-diameter holes in clay, mud or sand—ends digging drudgery, cuts digging time 50% to 75%. Powered by a portable gasoline-engine-driven generator.



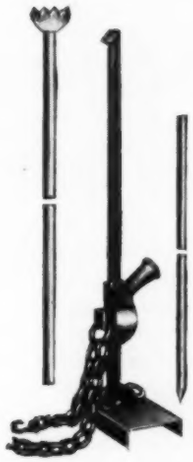
NEALE CABLE SPINNER
"Spins" cable and strand together, eliminating rings and ring-cutting, and forming a continuous bond between cable and strand, for increased protection against lightning, power crosses and tree damage.

Ask for Complete Information and Prices



LDING TAKE-UP REEL
W stand and metal reel fold up fo y stowing. Ruggedly built of ha d, steel and malleable iron.

DICKE PIKE POLES
With unique "Stick-Tite" pike, which goes in easily, locks in place for maximum safety, yet comes out with a ...st of the hand.



SIMPLEX POLE JACK
One man—unaided—can push poles back in line quickly and safely, with this husky tool. Use also for tightening guys, pulling cable, etc.

DIGGI ARS
of spec by heat-
Double ed cut-
end, p t other

AUTOMATIC ELECTRIC

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Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

CONGRESS with its "Reconversion" session, which has just started, now occupies the center of the stage for American business, including the telephone industry, because of the importance of the planning for postwar wages, price control, Federal housing, tax revision, airport development and the proposed national research agency. This is greatly in contrast with the years of the Roosevelt Administration, when the decisions of the executive agencies and departments—and, of course during the war, the military services—were the all-important developments.

In his most comprehensive Message to Congress, President Truman gave a blueprint of how his Administration desired to launch the nation on the transition from the war-time economy to the peace-time ways of life. Besides recommending to Congress over a score of proposals to be enacted into legislation—many of them highly controversial so the course of enactment will be thorny—, President Truman set forth his Administration's program in clear-cut detail to secure governmental guidance and help for virtually every element of the American population.

Certainly, as every observer in Washington recognized, it was not simply a Message to Congress, but it was the 1948 campaign platform of President Truman. Thus during the next two years the air in Washington will be supercharged with politics with the Republicans having already accepted the Truman challenge. The President definitely showed that he will campaign in 1948 on a course for the nation, slightly left of center. He has made a very strong bid for the support of labor with his program for an increased minimum wage, full employment, unemployment compensation and complete recognition of collective bargaining, conciliation and voluntary arbitration. But, unlike President Roosevelt, Mr. Truman did not flay business in his Message—interlarded in the remarks on his concern for controlling inflation were statements that stability of cost is essential to sound business planning. . . "it is not the time for labor leaders to shirk their responsibility and permit widespread industrial strife."

Wage Legislation

THE views of the nation's Chief Executive on the Fair Labor Standards Act urging a substantial increase in the present 40-cent-an-hour minimum wage level to eliminate substandards of living constituted the most significant portion of his "blueprint" to Congress for the telephone industry. The consideration of the increasing of the minimum wage will undoubtedly be one of the first questions to be taken up by Congress as before both the Senate and House are the bills (Pepper resolution in the Senate already approved by a Senate Education-Labor Subcommittee) which would boost the present minimum wage to 65 cents an hour with a top of 75 cents within two years. The Independent telephone industry is greatly concerned over this program and the U. S. Independent Telephone Association has studied ways and means of presenting to Congress the problem of higher wages for the small telephone companies in the rural areas of the United States.

There is the danger, too, of the exemption in the Fair Labor Standards Act for telephone operators in exchanges of less than 500 stations from the minimum wage requirements being revoked. President Truman's message may have opened the way for such a step in his statement that "the scope of the Fair Labor Standards Act should be clarified and extended" and his reference to the twilight zone in agricultural processing of some workers being covered and others doing similar work not being under the statute. The exemption from the minimum wage requirement for these small exchanges has also taken a "bad beating" from the National War Labor Board—most recent example was the National Telephone Commission decision in the Upstate Telephone Co. of New York case; **see article on dissenting opinion of industry members on page 82.**

Position of Industry

THE presentation of its position by industry on the increasing of minimum wages to Congress must be done most carefully without emotional heat and based entirely on facts. The Independent telephone industry must stress that it is operating mainly in the small towns, villages and rural communities with a much lower cost of living than the cities and where rents, food prices and other expenses are much lower. The fact of telephone rates having been "frozen" during the war years shows how the industry abided by the government's desire to prevent inflation. In the coming Congressional hearings on the proposal for the increase in minimum wages the latter situation about telephone rates should be fully explained. President Truman's own message had a statement that is pertinent along that line—that "it will be similarly necessary for the Government to resist pressure for increases in wage rates which would imperil the price ceilings."

In the coming era of transition back from the war economy, both management and labor have to attain an atmosphere of mutual understanding. Recognition of the rights of labor to secure its share of the "good things of life" in earnings must be accorded. On the other hand, labor leaders cannot be excessive in their demands—such as a 30 or 35 hour work week with

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October 29-December 8

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FLORDUCT

for Communications

EFFICIENT—trouble-free service

STURDY—lifetime wear

EASY TO INSTALL—"La-in" the wires and snap on the capping

NEAT, SMOOTH—does away with unsightly, loose wiring; is inconspicuous and harmonizes with office fittings

RESISTANT TO ABUSE—will withstand mopping, kicking, hand truck and similar traffic

SAFE—electrically safe and mechanically strong

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FLEXIBLE FITTINGS—to meet every need

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Write for complete details

PIONEERS OF SURFACE RACEWAYS

National Electric
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NATIONAL ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

Candid shots at the WPB of J. B. Rees (left) asst. vice pres. of A. T.&T., and Carl Brorein, pres. of Peninsular Tel. Co., Tampa, Fla., by Edwin Webb of the WPB Communications Division. Both Mr. Rees and Mr. Brorein are on the Telephone Operations Industry Advisory Committee.

pay for 48 hours. It is to be hoped that President Truman's October management-labor conference will lay down a foundation for determination of the future wage and collective bargaining courses to minimize labor disputes. There is a possibility that the telephone industry will have a direct participation in the conference and it has been hinted by the Labor Department officials in charge of the arrangements that the National Federation of Telephone Workers, the dominant union in the telephone industry, may be invited as the representative of the Independent non-AFL-or-CIO affiliated unions of the country.

In the reconversion program of the United States, there are some "silver linings" for the telephone industry, both Independents and Bell System. There is promise of the continuation of the growth in telephone development that went ahead so fast during the war.

Rural Outlook Good

In the cities and larger towns, the comprehensive housing legislative program and the Independents who also jects the building of from a million to a million and a half homes a year with the private construction industry expending from six to seven billion dollars annually. This will mean telephone installations in huge volume as the war has stimulated the telephone consciousness of the American public tremendously.

For the Independent industry serving the rural areas, there are two bright prospects around the corner. The production of food to meet the needs of the United States and the war-torn world means that the same volume of agricultural production as existed during the war will be carried on. The farmer will have a prosperous condition during the next few years to come and this, naturally, means a high and increasing rate of rural telephone development. The President, too, urged Congress to "quicken the rate of progress in rural housing" so that farm families should enjoy an equality in housing with city dwellers. With this outlook of the growing demand and need for telephone service on the farms and in rural communities, the telephone industry, both Bell System and Independents, realizes fully that the implementation of a most comprehensive rural telephone development program is one of the No. 1 postwar tasks of the industry. (Incidentally, President Truman had NO mention whatsoever in his Message to Congress of the Rural Telephone Administration legislation.)

Manufacturing

FOR the manufacturing branch of the telephone industry, the outlook is also for plenty of work. The Bell System with its two billion dollar program and the Independents who also are planning rehabilitation and expansion of their systems will provide equipment orders, it is felt, which keep the manufacturing industry occupied in a most adequate fashion. Then, too, all the leading foreign countries are projecting substantial communications and telephone construction programs so foreign trade orders may provide a fair percentage of the manufacturing industry's output. Foreign trade orders are slated to start next spring after the foreign nations have secured the proper credits in the United States either through their own resources (Russia) or in U. S. government advances (France) or through Export-Bank loans (Norway; Latin American countries).

CONVENTION BAN LIFTS

With the announcement of the ODT on September 11 that all convention restrictions are to be lifted October 1, we should have some interesting and informative meetings this year with all that telephone people have to discuss and plan for in this postwar era that has barely begun.

At present USITA has indicated no change in convention plans.

Commissioner Walker Elected

COMMISSIONER Paul A. Walker of the FCC has been appointed to the Oklahoma Hall of Fame and will be inducted on November 16, Oklahoma Statehood Day. The award is made by the Oklahoma Memorial Association each year to four outstanding citizens of Oklahoma "who have made on outstanding contribution to the state and nation."

Commissioner Walker has been in public service more than forty years and is the only original member of the FCC still with it. His early career was spent in public education in Oklahoma after which he became attorney to the Oklahoma Corporation Commission, then a member and finally Chairman, a position which he held until 1934 when he became a member of the FCC.

Public Works

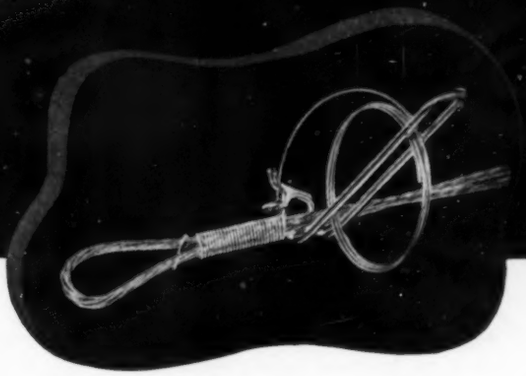
ONE other phase of the President's program for public works—the building of approximately 3,000 new airports and the improvement of more than half the existing 3,000 airports in the United States—presents a problem for the telephone industry. The legislation, now pending before the Senate and House, has to be clarified as to the compensation to the telephone companies and utilities in the case of relocation of their facilities under this airport construction. The airport program is to be spread over a period of 10 years and the cost, as proposed in a survey by Secretary of Commerce Wallace, would be shared equally between Federal and non-Federal governmental agencies.

Tax Relief Plans

TAX revision is definitely in the wind. Chairman George of the Senate Finance Committee has announced his taxation program which would mean the repeal of the excess profits tax, a $5 billion reduction in personal income and corporation taxes with corporations to have their tax burden slashed by 2½ billion dollars. He would effect this through an across-the-board reduction of 15 to 18 percent. The program was to be studied at a Joint Congressional Committee on Internal Revenue Taxation meeting in mid-September. **Within next year, Congress will terminate the excise taxes on local telephone monthly bills and long distance and TWX traffic through the official termination of the war, these excise levies being due to be dropped automatically six months after the end of the war.**

GOOD THINGS

come in small packages



Lots of truth in that old saying. Many a lineman has learned how well it applies to the Bethlehem serving tool.

This little gadget is simple, light in weight, easy to carry . . . but what a big job it does on a dead-end serve! Using a 10-ft. coil of 11-gage bethanized wire, the lineman hooks one end in place on the strand; then, engaging the wire between the fingers of the serving tool, he wraps it solidly in place with a simple rotary motion.

Well, you say, that's all very fine. But what are the advantages of the Bethlehem serving tool from *my* point of view?

Fair enough question. Here are some answers:

★ *Clean, strong serves.* Laboratory tests have shown conclusively that this type of serve holds beyond the useful strength of the strand.

★ *Economy.* Bethlehem dead-end wire, used with the tool, costs only a few pennies per 10-ft. coil—considerably less than even a single inexpensive clamp; and only one size of coil is needed for the commonly used sizes of strand.

★ *Basic simplicity.* That's one of the best things about the serving-tool technique. After a very little practice, your linemen can make their serves in about the time required to attach conventional clamps.

The serving-tool method is recommended primarily for use with bethanized strand and wire. Bethanizing, an electrolytic process used exclusively by Bethlehem, applies a corrosion-resisting zinc armor to every wire in the strand. Because of its unusual ductility, this coating is not displaced to any harmful extent by the action of the serving tool.

Ask a Bethlehem man for full details.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Now is the Time to . . .

- ***Start using service connectors in place of hand connections between drop wire and line wire. It is almost impossible to get a good low resistance reliable hand connection between drop wire and line wire.***
- **Investigate the use of portable type electrically driven earth augers. The experience of many companies shows that substantial savings in hole costs can be obtained through the use of the motor driven earth auger.**
- ***Standardize on the use of drop wire clips and clamps in place of the old fashioned hand ties.***
- **Substitute the canvas bucket and hand line method of raising and lowering tools to lineman working aloft in place of the dangerous practice of throwing materials up to the lineman working on the pole.**
- ***Purchase and install neat enameled steel signs to show the location of the main telephone office and of long distance telephones. Every telephone office should be properly marked so that a stranger in the community can locate the one building in which he knows he can always make a long distance call.***
- **Replace worn tools such as shovels, tamps, pliers, etc. which slow down workmen and increase labor costs.**
- ***Substitute a convenient one-man chain hoist in place of the old fashioned block and tackle.***
- **Make permanent repairs at trouble points in the cable plant which have been temporarily taped up due to the lack of trained cable splicers.**
- ***Visit protected cable terminals and check condition of an arrestor block to insure that adequate protection is provided on all entering lines.***
- **Install additional terminals in blocks which are congested with long runs of subscribers' drops.**
- **Transpose rural lines which are noisy due to long parallels with power lines.**
- ***Standardize on the eyebolt method of dead ending in place of the old fashioned wrap type dead ends.***
- **Consider the economic and service possibilities that would accrue from mechanization of the smaller manual exchanges, which due to the high labor costs, can no longer be operated at a profit.**
- ***Purchase testing equipment which will facilitate and speed up the work of rural testmen. The "hunt and find" trouble method is costly. Most trouble can easily be located by a directional type magneto fault finder.***
- **Establish a program for the replacement of obsolete and low efficiency type telephones with the new high level telephones which will give greatly improved transmission and encourage the greater use of long distance.**
- ***Plan a sales program looking to the early installation of extension telephones, loud ringing bells, wiring plan installations and other revenue producers as soon as equipment is again available.***

Research

THE legislative proposal to put into effect the proposal of Dr. Vannevar Bush, Director of the Office of Scientific Research and Development, of a single Federal research agency to promote national defense and security research, basic sciences, medical and public health research was strongly advocated by President Truman who utilized the development of atomic energy as the "clear-cut indication" of what can be accomplished by the universities, industry and government working together. The President, however, stressed that the Federal agency "should in no way impair" the freedom scientific activities. This subject will require a huge amount of study by Congress and the Congressional committee consideration may not get started for some time. But it is a subject of great significance to the telephone industry and the laboratories of its manufacturing branches.

Government Reorganization

OTHER subjects before Congress of significance to the telephone industry are:

1. The reorganization of the Executive Departments and Agencies, which is sought by President Truman. Every indication is that the FCC will be an exempted agency and will remain an independent quasi-judicial unit of the government, responsible solely to Congress. The plan of the merger of the Army, Navy and Air Forces into a single Department of National Defense will undoubtedly be removed from the pending reorganization bills before Congress and will be the subject of a separate legislative study.

2. One of the first actions of the present Congressional session will be the establishment of a single Surplus Property Administrator—able W. S. Symington of St. Louis, who headed one of the leading electrical equipment supply companies of the country—in place of the present three-member board. The SPB is at present undergoing considerable internal reorganization to make its policies and administration more efficient. By enrolling the manufacturing companies as disposal agents for the Government, it is felt that a good foundation has been established and the way is prepared for the disposal of the very substantial flood of military surplus communications-electronic equipment and parts that is now about to pour into the SPB's jurisdiction.

3. President Truman's suport of the power authorities, like MVA, CVA and

the Arkansas River Authority, is of some collateral interest to the communications industry, but is primarily the headache of the electric power and light industry.

Advisory Comittee Meets In Final Session

THE WPB leadership is being asked by the Telephone Operations Industry Advisory Committee at its final meeting, September 20, to continue the precedence for telephone installation schedules in Order U-2 after the termination of the Office of War Utilities and its Communications Division the end of September. The Committee, in its proposal to the WPB, made changes in Schedule A on the preference for telephone service to emphasize reemployment and reconversion.

The plan is to have a unit in the WPB organization after the demise of the OWU and Communications Division to handle appeals from the U-2 restrictions. In the revision of Schedule A, the listings relating to war production were dropped and were replaced with categories of telephone applicants which would bulk large in reemployment and reconversion planning and activities. The public safety and health categories were retained in Schedule A.

The revision of the precedence list was formulated at a task committee meeting of the Industry Advisory Committee held in New York Sept 7. At this meeting were J. B. Rees, assistant vice president of the American Telephone & Telegraph Co.; President Harold V. Bozell of the General Telephone Corporation; President Carl D. Brorein of the Peninsular Telephone Co. of Tampa, Florida; and Board Chairman John R. Porter of the Carolina Telephone & Telegraph Co.

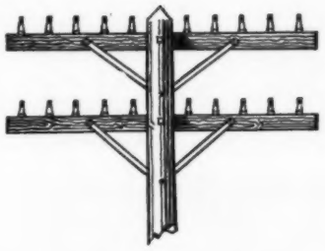
Order U-HOO

A "wake" of the Office of War Utilities and its Communications Division, which goes out of existence September 30, is to be held at the Mayflower Hotel, September 21. Invitations to the "wake" were issued in a humorous form as Order U-HOO (Convocation and Revocation) by the Office of Raw Utilities." (The Washington Editor of TELEPHONE ENGINEER was one of those invited.) The U-HOO contained the usual WPB legal language and described "operating supplies," priorities," etc., in a most humorous way. Schedule A read: "Spouse includes actual, proposed and tentative." The invitation order was signed by J. A. Jumpin Jehossephat, Recording Secretary.

OVERHEAD

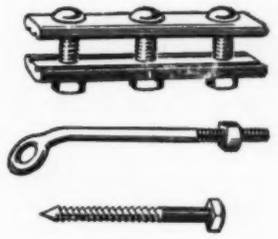
SUPPLIES THAT KEEP MAN-HOURS DOWN

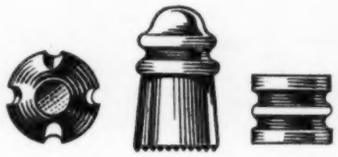
Years of service have proved the durability of these supplies under all weather conditions. They can help to simplify your maintenance problems. For details, or for information about any of the hundreds of other first-quality supplies that GRAYBAR distributes, call our nearest office. *Graybar Electric Company, Graybar Building, New York 17, N. Y.*



CROSSARMS—For strength, durability, and lightness of weight, you can't beat Rainier clear Douglas fir crossarms—available locally via GRAYBAR. GRAYBAR also stocks Rainier pins.

HARDWARE—Bolts, brackets—lag screws, pole steps—GRAYBAR distributes everything in Hubbard pole-line hardware, assuring you of high-quality items designed specifically for telephone work.





INSULATORS — Via GRAYBAR, you can get glass or porcelain insulators—porcelain spools, knobs, tubes, and guy-strain insulators—generally from local stocks.

WIRE and STRAND—GRAYBAR offers Crapo galvanized steel telephone line wire, combining high tensile strength with low electrical resistance; Crapo stranded guy wire; Whitney Blake drop wire. 4572

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First Source of Telephone Supplies

IN OVER 80 PRINCIPAL CITIES

Personalities

Benjamin H. Cravens has been named vice president and general manager of the Jamestown (N. Y.) Telephone Company. He succeeded **C. L. Gleaves,** who resigned to resume his law practice in New York. Cravens was division commercial superintendent of the New York Telephone Company.

●

Col. Ralph L. Hart, until recently director of the Procurement Division, Office of Chief Signal Officer in Washington, has returned to the Western Electric Company's New York headquarters as distribution manager of the telephone sales division, the post he held before entering service in 1942, as a Lieutenant-Colonel in Army Ordnance.

●

Wilbur W. Hetzel, secretary and treasurer of Stromberg-Carlson Co., Rochester, N. Y., is recuperating at Rochester's Highland Hospital following a serious illness.

●

Don W. Walker, executive secretary of the New York State Telephone Association, has notified members of that group that their association committee studying the effects of the suggested rural line extension policy recently adopted by the N. Y. Bell has set out its recommendations for consideration by the Independent telephone companies which were asked to advise the Public Service Commission of their attitude toward the adoption of such a plan. Under the plan referred to, the telephone company would construct ½ mile of pole line without charge for each applicant and a charge of 48c per 1/10 mile would be made for line extensions in excess of ½ mile for a period of 5 years.

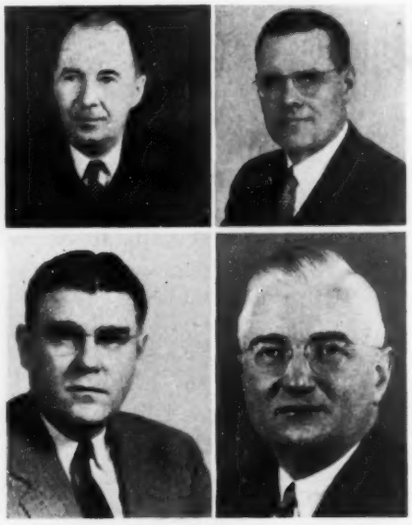
●

Hon. Gordon Persons, president of the Alabama Public Service Commission, Montgomery, is expected to be a candidate for Governor of Alabama in the 1946 elections. He was co-author of the Hill RTA Bill introduced in the U. S. Senate in January.

Edward W. Jones, 49, owner and operator of the Stella & Stark (Mo.) City Telephone Company, died of a heart attack while at work on August 11.

●

B. T. McCarter W. Powell



S. W. Cooper A. G. Barry

Wellington Powell, general commercial manager of N. Y. Tel.'s Upstate area, was transferred to New York in the same capacity succeeding **J. C. Whitcher,** who died August 1.

Bertram T. McCarter, division manager at Buffalo, was appointed general commercial manager of the Long Island Area succeeding **B. H. Cravens,** who resigned recently. **Allen G Barry,** who has served as general traffic manager of the Upstate Area since the death of **E. B. Russell,** was transferred to the commercial department as general commercial manager; and his place as general traffic manager at Albany was taken by **Stuart W. Cooper,** formerly division traffic manager at Buffalo.

●

L. D. Richardson, 84, for many years a leading figure in telephone circles in North Dakota died last month at Fargo. He served the industry 47 years.

W. T. Autry is the new general manager of the Oklahoma Telephone Company at Broken Arroca. He succeeded **J. W. Walton,** who retired August 15.

●

John C. Longstreth is the new general traffic manager of Bell Telephone Company of Pa. He succeeds **Charles W. Potter,** who has transferred to the Operation & Engineering Department of A.T. & T., N. Y. **James V. Walsh** is the new general traffic manager for Bell of Pa., in the western part of the state, and **Harry E. Cooke,** general traffic staff engineer, has been named the Philadelphia division traffic superintendent.

●

B. A. Doyle, 61, manager and operator of the Sandborn (Ind.) Co-op Telephone Company died at his home August 19.

●

Donald L. Chaffee has joined the sales engineering department of the Copperweld Steel Company, Glassport, Pa. Mr. Chaffee comes direct to Copperweld from the wire branch of the Signal Corps Engineering Laboratories, Camp Coles, New Jersey. For his outstanding services in overseas theatres he holds the Meritorious Civilian Award.

●

W. H. Beck, secretary of the Indiana Telephone Association, has been busy of late bringing the association to its members. District meetings this month were held at Nappanee on the 12th, Auburn, 13th and Markle on the 15th. War's end and its attendant demands on the telephone industry is the main subject of discussion.

●

Lt. Dean M. Ratts, formerly in the Santa Barbara plant department of Associated Telephone Co., Ltd., Santa Monica, Calif., was killed in a flight over Holland last February, according to captured official German documents.

●

Claude Walker is the new manager of the Farmers Independent Telephone Company of Red Cloud, Nebraska.

For once, we were copy-cats!

...by special request

Just behind the battlefront in Western Europe a telephone system lay dead. The Germans, hoping to return, had not blown it up but had taken with them its vacuum tubes.

Our Signal Corps went to work "on the double." A local engineer supplied some general notes on the system. One tube believed to be of the missing type was found. Notes and tube were flown to the U. S.

At Bell Labs, tests and X-rays revealed the tube's inner construction and electrical characteristics—proved that no similar tube was available here. The German tube differed also in dimensions of bulb and base and in arrangement of pins. Hurried calculations indicated a suitable tube could be built from existing parts—except for a grid and the base.

At Western Electric, the tube shop modified machines to wind the grid, and in three days produced eight tubes with handmade bases, which were flown to Europe for trial. Production went ahead and 17 days after the German tube was received, 1,015 duplicates were completed. Result: the Signal Corps soon had the German telephone system operating.

Bell Labs and Western ordinarily wouldn't be happy about copying *anybody's* products. We developed the first telephone repeater tubes—have long created our own superior designs. Working together, Bell Labs and Western solved many of the war's toughest electronic problems. In the years ahead, count on this team for continued leadership in the communications equipment field.

More than 1000 tubes like the one above, duplicates of an unknown German tube, were produced by Bell Labs and Western Electric in 17 days. They helped put an important enemy communications system back to work for our Army.

Western Electric
ARSENAL OF COMMUNICATIONS EQUIPMENT

Leighton H. Peebles

Story of

WPB Communications Division

Told By Director Peebles

By ROLAND C. DAVIES

THE story of the Federal Government's experience in handling the problems of the wire communications industry during World War II with a group which, in Dec., 1941, comprised two people, by Feb., 1943, had expanded to include 96, and, in anticipation of the termination Sept. 30 of the Office of War Utilities, now numbers 16, was told recently by Leighton H. Peebles, Director of the Communications Division, Office of War Utilities, War Production Board. Despite an increase in exchange calls of about 6 percent and long distance calls of about 160 percent, the objective sought by the Division—the saving of critical materials and labor and, at the same time, the rendition of maximum service to the war effort has been attained and the savings have been "much more than anyone would have dared estimate to be possible," according to Mr. Peebles.

(The OWU has been in existence since Feb. 23, 1943, and was first headed by "Cap" Krug, now WPB Chairman. Edward Falck, who submitted his resignation effective the end of September but has not yet disclosed his future plans, succeeded him in the fall of 1943. At the same time, it was revealed the MRO orders U-3 and U-4 were going to be amended to put an expiration date on them timed with the OWU termination.)

Representative of the Communications Division's success in the reduction of copper consumption alone is the fact that the telephone industry's 1943 consumption of that critical material was 10.8 percent of its 1940 consumption, and that the telegraph industry's 1943 consumption was 8.6 percent of its 1940 figure. That further savings of material, manpower and facilities were accomplished by the Division's reduction of operators' inventories of materials and supplies is shown by the fact that the reduction in aggregate inventory for 1943 alone amounted to approximately $30,000,000 or 35 percent.

Industry's Contribution Lauded

MR. Peebles paid tribute to "those representatives of the industry who accepted dollar-a-year appointments and have spent much of their time working in the Division." The industry loaned to the Division the services of some of its ablest men who, during the early days, worked continuously with the Division's personnel devising the necessary limitation orders to effect the maximum savings of critical material with the minimum dislocation of service to the public and at the same time provide for rapidly increasing essential needs of the Government, the military, and war-supporting industries," he said.

Emphasizing the role played by cooperative effort in the reconciliation of the needs of the operating industry and the military, Mr. Peebles thanked, too, the top staff of the War Production Board, the Army, the Navy, the Board of War Communications, the Federal Communications Commission and the Industry Advisory Committee.

Organized Dec. 20, 1941, the Communications Branch of the Office of Civilian Supply was transferred to the War Production Board Feb. 18, 1942, and became the Communications Equipment Division Nov. 11, 1942. The Division became an operating division of the Office of War Utilities February, 1943.

From April to August, 1942, the Branch included a Radio Section, which was transferred on the latter date to the Radio and Radar Branch.

Division Started With Two Members

THE leadership of the Communications Division and all policy and administrative determinations at the Division level have been Mr. Peebles' responsibility from its inception, when he and his secretary were the Division's only members. Additional employees enlarged the group until it consisted of 15 people in a room not much larger than Mr. Peebles' present office, "practically around one desk." The Division moved from Temporary "E" to the New Post Office Building where, by Feb., 1943, it had expanded to include 96 salaried employees and six dollar-a-year men. A year later the Division took up offices in Temporary "R." Current employees number 16 salaried people and two consultants, with termination of the Office of War Utilities scheduled for Sept. 30.

Key personnel of the Division have numbered among their ranks such

well-known names in the communications field as E. Dean Clark, James T. Daly, H. F. Lowe, K. H. MacGibbon, Bruce H. McCurdy, F. T. McNamara (formerly deputy director) and W. F. Sloan. M. A. Cook (now deputy director) and E. H. Merrill (Chief, Telephone Section) are still with the Division.

Consultants have included G. A. Berting, Carl D. Brorein, C. Glen Harvey, Clarence E. Jones, George K. Manson, K. W. Richards, C. V. Stone and W. W. Truran. G. DeF. Edwards and R. A. Lumpkin are still there.

Assignees from within the WPB and from the Army-Navy Munitions Board, the Signal Corps, the Navy, the FCC and other Government agencies have included Lt. E. J. Fahey, Maj. John G. Hubbard, Lt. B. H. Marshall, H. Graham Morison and Lt. I. A. Parks, Major H. E. Gove Lt. D. V. McNamee, Jr., Maj. H. A. Stevens, G. J. Dempsey and Lt. R. Van Meter are still associated with the Communications Division.

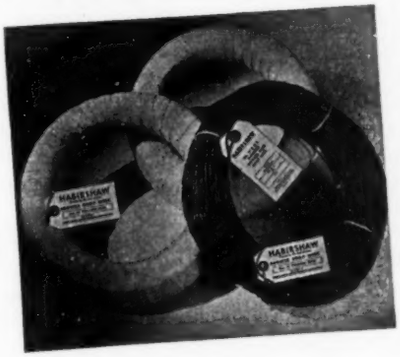
Division Issued Six Orders

THE Communications Division has, in the course of its career, issued two telephone orders, two telegraph orders, one purchase order and one manufacturing order. Telephone Order "U-2," issued March 2, 1942 as "L-50," redesignated as "U-2" March 25, 1943, and subsequently amended, establishes standards and procedures of operation for telephone communication. Telephone Order "U-3," issued April 23, 1942 as "P-130," redesignated as "U-3" April 1, 1943, and subsequently amended, assigns priority rating to deliveries of materials for maintenance, repair and operating supplies, and restricts inventory and purchase. Telegraph Order "U-4," issued Oct. 17, 1942 as "P-132," redesignated April 1, 1943 as "U-4," and subsequently amended, prescribes for the telegraph services what "U-3" does for telephone communications. All three of the foregoing orders are still in effect.

Telegraph Order "U-6," issued June 24, 1943, subsequently amended, and revoked April 26, 1945, established standards and procedures of operation for telegraph services. Purchase Order "U-5," issued Sept. 28, 1942 as "L-148," redesignated April 1, 1943 as "U-5," subsequently amended, and revoked April 27, 1945, restricted the transfer of wire communications equipment. Manufacturing Order "U-8," issued October 17, 1942 as "L-204," redesignated March 18, 1944 as "U-8," subsequently amended, and revoked April 26, 1945, controlled the manufacture of telephones.

STROMBERG-CARLSON
RECOMMENDS—

HABIRSHAW



No. 17 Bronze Drop Wire

Distributed Exclusively by
STROMBERG-CARLSON

High strength bronze conductor . . . expertly blended synthetic rubber insulation . . . soft, unbleached cotton braid, thoroughly saturated to provide a long-lived moisture-resisting covering.

A Quality Product Made by
Phelps Dodge
Copper Products
Corporation

Habirshaw Cable and Wire
Division

DEFY THE ELEMENTS

HEMINGRAY No. 16—Has square groove which provides substantial support for line wire.

HEMINGRAY INSULATORS are carefully designed to withstand the elements.

Experience has shown Hemingray Insulators never fail to render dependable, long-life service. That's why leading telephone companies have adopted Hemingrays as standard equipment.

Many of these famous insulators are still in service after 20, 30—and even 50 years.

The exacting step-by-step quality production control insures long life in every Hemingray Insulator.

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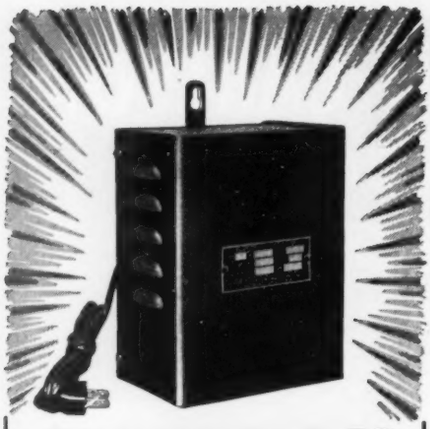

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Operates direct from lighting circuit. Delivers constant, humless D.C. to operator's circuit on magneto switchboard. Power-off relay assures uninterrupted service in case of power failure. Low in cost! See your jobber, or write direct for full information.

SCHAUER MACHINE COMPANY
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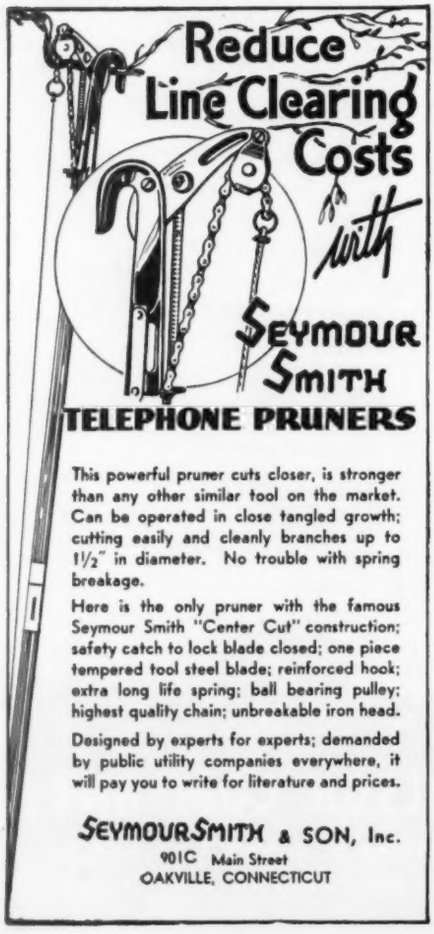

TELEPHONE PRUNERS

This powerful pruner cuts closer, is stronger than any other similar tool on the market. Can be operated in close tangled growth; cutting easily and cleanly branches up to 1½" in diameter. No trouble with spring breakage.

Here is the only pruner with the famous Seymour Smith "Center Cut" construction; safety catch to lock blade closed; one piece tempered tool steel blade; reinforced hook; extra long life spring; ball bearing pulley; highest quality chain; unbreakable iron head.

Designed by experts for experts; demanded by public utility companies everywhere, it will pay you to write for literature and prices.

SEYMOUR SMITH & SON, Inc.
901C Main Street
OAKVILLE, CONNECTICUT

J. H. Hazlett Goes to Brazil For Automatic Electric

Announcement has been made by H. F. Lello, vice president and general sales manager of International Automatic Electric Corporation, of the appointment of James H. Hazlett, Automatic's representative in southern California for the past several years, as manager of Automatic Telephones Limited of Brazil. Mr. Hazlett will shortly leave for Sao Paulo where he will take up his new duties, replacing J. B. Haley who is returning to the United States after spending more than three years in Brazil.

Mr. Hazlett brings to his new duties a broad range of telephone experience which includes operation and maintenance for telephone companies, as well as installation, engineering and manufacturing experience for Automatic Electric.

Entering the employ of Automatic Electric Company in 1907, Mr. Hazlett took the Company's training course, and then went to Portland, Oregon, to undertake maintenance work on Strowger Automatic equipment for the Home Telephone Company of Portland. Four years later, he went to Billings, Montana, where he took charge of one of the automatic offices, remaining there until 1917, when he returned to Chicago to enter the engineering inspection department of the Automatic Electric factory.

In 1919, Mr. Hazlett was placed in charge of Engineering Inspection, and over a period of eight years developed that department to conform to the fast growing equipment requirements in the field.

He then entered the installation department, and in 1932 took advantage of an oportunity to return west, where he engaged in service work, later entering the sales organization. For the past ten years, he has had charge of the Los Angeles sales office, where his technical knowledge and genial personality have combined to make him well and favorably known to Independent telephone men in that area.

J. H. Hazlett

Hawaii Pioneer Chapter Enjoys Social Gathering

The John A. Balch Chapter, Territory of Hawaii, of the Independent Pioneer Telephone Association recently had a record group out for a picnic and charter party. The Mutual Telephone Company, with telephone systems on the Islands of Oahu, Hawaii, Maui, Kauai and Molokai, has many active members in the John A. Balch Chapter, which was named to honor one of the outstanding pioneers in the communication field in the Territory of Hawaii. This group was first introduced to our readers in the April issue of FORTNIGHTLY.

Lawrence Clark, president of the John A. Balch Chapter, left, received the framed charter from W. C. Avery, president & general manager of Mutual Telephone Company, at a recent social gathering of the newly formed chapter in Honolulu.

Cooley Joins Southwestern Bell

Victor E. Cooley, since 1929 a vice president and director of the New York Telephone Company in charge of its public relations, resigned August 31, to become first vice president of the Southwestern Bell Telephone Company, in charge of operations. He was elected to his new office by the Southwestern company's board at a meeting at the St. Louis headquarters on August 24, and took office September 1. The company operates some 2,000,000 telephones in the states of Missouri, Kansas, Arkansas, Oklahoma and Texas.

Victor E. Cooley

Born in Cloverdale, Calif., Mr. Cooley attended the University of California and entered telephone work in 1911 as a traffic student in the Pacific Telephone and Telegraph Company. He served in the U. S. Navy in World War 1. In 1921 he went to St. Louis as general toll traffic engineer of the Southwestern company, and then served as its traffic superintendent for Texas.

Mr. Cooley came to the New York Telephone company in 1926, first as division commercial manager at Buffalo and then as general commercial manager for the company's Upstate area.

Acquires Additional Property

The North Carolina Utilities Commission approved August 22 the transfer of property to the Durham (N.C.) Telephone Company from the Durham County Board of Education, Trustees of Bethesda Baptist Church, David Stallings and others, including all rights, titles and privileges in certain telephone wires extending along the Southern Railway tracks and the Old Raleigh-Durham Highway.

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RECOMMENDS—

SUB-CYCLE

A Powerful
RINGING CURRENT

. . . that meets the EXACTING REQUIREMENTS of your needs. SUB-CYCLE has proven its superiority under the most severe operating conditions because it has . . .

★ No Moving Parts
★ Requires No Routine Maintenance
★ Nothing to Lubricate
★ No Radio Reception Interference
★ Economical, Quiet Operation

TO SUIT YOUR DEMANDS
6 MODELS
Ranging from outputs of 7½ to 45 watts covering use from P.B.X.'s to large central offices.

"The Choice of the Telephone Industry"

Crapo
STEEL STRAND

1—HIGH STRENGTH
2—RUGGEDNESS
3—LONG LIFE
4—ECONOMY

The superior tensile strength that only steel can give . . . . the ruggedness to withstand severe punishment . . . . the ability to outlast normal needs . . . . all these are combined—with outstanding economy—in **Crapo** Galvanized Guy and Messenger Strand.

Long life and low maintenance costs are characteristic of this time-tested product. Heavy, ductile, tightly-adherent zinc coatings, applied by the **Crapo** Process, provide lasting protection against corrosion. The inherent strength and endurance of the steel makes for dependable, maintenance-free service.

Crapo Galvanized Products also include **Crapo** HTL-85 and HTL-135 High-tensile, Low-resistance Line Wire; E.B.B., B.B. and Steel Telephone Wire; Construction Wire; Tie Wire, and Ground Wire.

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★ *Special Issue Feature*

Notes on . . .

POSTWAR PLANT PROBLEMS

• *How Much Noise?*

WITH the war's end many Independent companies that have not heretofore had to contend with rural electrification soon must face the "noise." When an REA district is definitely assured for a given area, the telephone company should immediately examine the power district's plans to determine how many and what length parallels are likely to be involved. If one-half mile or longer parallels with any telephone line are proposed, no time should be lost in providing ways and means for metalizing the telephone line.

The practice, which has been somewhat prevalent in the past, of waiting to see how much noise will be developed is a poor plan. The telephone field has had sufficient experience by this time to know that the noise level which will be experienced from virtually any parallel with a multi-grounded rural power line is bound to be in excess of that which can exist on a grounded rural telephone line and still permit good commercial service to be rendered.

This point is illustrated by the data given in Table No. 1 which gives the noise levels on eight rural lines in a specific but typical case and which involves various length parallels with REA lines.

Keep in mind that 300-400 noise units are about as much as should be allowed on a rural line.

• *Recommended Procedure*

IF your company is faced with REA parallels and it is definitely known that the power lines will be built within a reasonable time, you will need to proceed somewhat along the following lines:

(1) Prepare a map of your rural lines showing all parallels with the proposed power lines.

(2) If economic considerations make it impractical to metalize all of the telephone lines, consideration should be given to various expedients which would permit only a portion of the telephone lines to be metalized and the

Table No. 1—Noise Measurements for a Typical REA Parallel Noise Units

Line No.	Miles of Parallel	Elec. Line Energized	Elec. Line Not Energized
14	5.00	5,249	
16	2.32	1,738	
23	3.96	2,631	70
26	6.58	11,094	
29	1.54	1,479	
33	1.60	468	197
42	1.20	989	
50	0.04	186	

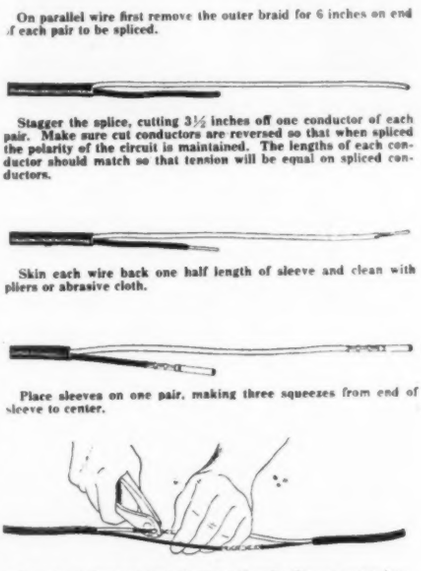
On parallel wire first remove the outer braid for 6 inches on end of each pair to be spliced.
Stagger the splice, cutting 3½ inches off one conductor of each pair. Make sure cut conductors are reversed so that when spliced the polarity of the circuit is maintained. The lengths of each conductor should match so that tension will be equal on spliced conductors.
Skin each wire back one half length of sleeve and clean with pliers or abrasive cloth.
Place sleeves on one pair, making three squeezes from end of sleeve to center.
Fit ends of other pair into sleeves and make three compressions as before, beginning at ends and working towards centers.
Shows finished splice before taping. Rubber tape is recommended for each conductor splice and friction tape over the pair.
Shows finished splice of twisted pair, drop or bridle wire before taping.

Fig. 1—Compression sleeve drop wire splicing procedure. (Courtesy National Tel. Supply)

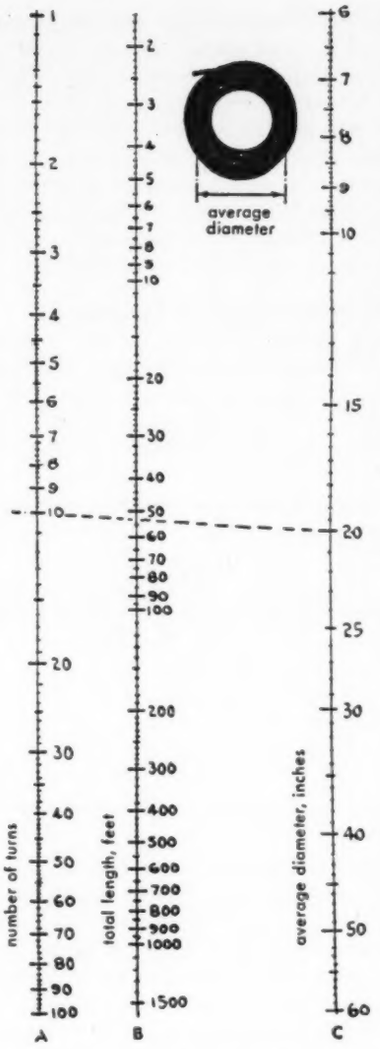

Fig. 2—Chart used for calculating amount of wire in coil. (Courtesy Copperweld Steel.)

balance to be operated on a grounded basis. This would involve the use of repeating coils, possible rerouting, etc.

(3) With plans prepared showing the lines which will need to be metalized, work up material and labor requirements and costs.

(4) If funds are not available for financing this capital addition, consideration must be given to the financing problem.

(5) Study the need for increased rates to cover the improved service and higher plant investment that will result from a metalization of the rural plant.

• *Drop Wire Splicing*

MANY of the smaller telephone companies have been coasting along during the war emergency using inadequate tools and out-of-date methods with the thought that as soon as the world-wide conflict was over new modern tools and methods would be adapted. The past few years have seen

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DIAMOND C POLES For Strength

Mfd. by Colfax Lumber & Creosoting Company, Inc.

For the greatest strength in poles, use COLFAX Creosoted Yellow Pine Poles.

The poles are treated full length under pressure with the finest and cleanest obtainable grade No. 1 Creosote Oil, a pure distillate of coal tar, in accordance with AWPA standards.

Each pole, after being carefully graded according to the physical specifications, is treated with eight pounds of creosote, or more if the customer desires.

COLFAX Creosoted Yellow Pine Poles will assure you the lowest annual pole cost obtainable.

For strength and economy, use

DIAMOND C

Creosoted Yellow Pine Poles

Are Your Lines SAFE?

When a pole goes down, the cost of pole and wire replacement goes up.

The new DILLON BISECTOR will cut your chances of guying failures to the absolute minimum. ***Without*** the supervision of an engineer, a workman can ***accurately*** bisect the angles and spot anchors at the exact point where they will function at 100% efficiency.

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The Keynote of the New DILLON BISECTOR

Easy to use—Rugged—Compact—Lightweight—No skill to operate—***Eliminates*** tape lines or fancy figuring.

A QUALITY TOOL With a Real Purpose

SAVE TIME—SAVE MONEY SAVE SERVICE

USE THE DILLON BISECTOR

- NO CHARTS
- NO FIGURING
- NO MEASURING

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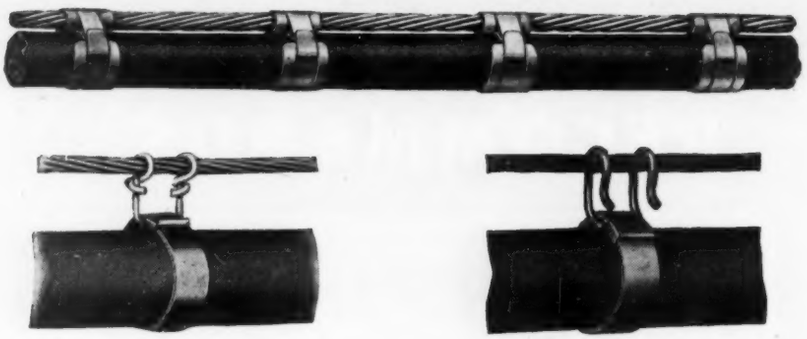

Fig. 3—Typical zinc strap type cable hangers.

the development of a number of new practices and tools that have been proven-in and adopted by the larger telephone companies. The smaller companies that have not yet taken advantage of the improved maintenance and lower costs made possible by these tools will find this an ideal time to do so.

In a recent survey among small companies, it was surprising to find that some are still splicing drop and inside wire by the old inefficient hand splice method.

Of all the practices that are easy to apply and which involve inexpensive tools, drop and inside wire compression splicing represents the best example. Compression type sleeves have proven themselves over a number of years and are now standard with virtually all of the larger companies. It is not too much to say that there is no company so small but that it can afford to own a compression type splicing tool and to use compression sleeves for splicing drops and inside wire.

Compression splices are mechanically strong and electrically above reproach. Hand splices unless carefully made by an experienced lineman are apt to give way under strain and are often a source of high resistance. Furthermore, they take longer to make and are more difficult to tape up and get a neat appearing joint. Fig. 1 illustrates the several simple steps involved in making a compression splice in drop wire.

•*Calculating Coil Lengths*

WE are indebted to the Copperweld Steel Company for the chart, Figure 2, which is very useful when it is necessary to compute the length in feet of anything such as wire, cable, tubing, etc., which may be rolled up in coils. The chart is particularly helpful in connection with warehouse inventory or for calculating the amount of wire that is available in an existing coil to be used for a specific job.

To use the chart simply lay a straight edge across the three vertical columns with one end of the straight edge on the number of turns and the other on the *average coil diameter*. The total coil length in feet will be shown at the point at which the straight edge intersects the middle column.

Table No. 2

Maximum Size of Cable			
Diameter	Circumference	Length of Strap	Minimum Number of Wraps
3/4"	2 5/16"	8 "	2
1 "	3 1/8"	9 "	2
1 1/2"	4 3/4"	12 1/4"	2
2 "	6 5/16"	15 3/4"	2
2 5/8"	8 5/16"	28 "	3

Fig. 4—Use of telephone level-transit in hilly country.

•*Use of Adjustable Cable Hangers*

WITH prospects that adequate help will soon be available, many telephone plants will wish to proceed

Fig. 5—Views showing Keuffel & Esser telephone type level-transit.

promptly with major repairs. Many plant elements are so badly worn that they need immediate attention. This is particularly true of the aerial cable plant.

The prompt reconditioning of aerial cable plant will get No. 1 priority in many exchanges, particularly in exchanges that have been short-handed during the war. The usefulness of the *zinc strap type cable hanger* in effecting cable repairs should not be overlooked. These hangers have the merit of being adjustable as to height and of rigidly holding the cable to the zinc strap. They prevent wear and chaffing at the bearing support, and yet permit some transverse or longitudinal movement of the cable along the strand. They are particularly useful at poles for sleeve supports and for use in the span itself. The application of several different types of zinc cable hangers is shown in Fig. 3.

The length of strap and the minimum number of wraps for various size cables are shown in Table No. 2.

• *The Telephone Type Level Transit*

HUGE expenditures for road improvements throughout the country can be anticipated in the next few years. This will mean that many pole lines will need to be relocated. Telephone companies, both small and large will want to make certain that the new poles are located accurately with respect to road centers and in a straight line from the standpoint of appearance. Although poles can be lined up with fair success by merely sighting across several points located on the desired line, this is not the easiest nor the best method to employ. The development of a low priced and simple to use telephone type *level-transit* now makes it possible for any telephone company to own one of these useful instruments, which is shown in Figure 5. This instrument is useful, not only for sighting-in and lining up pole leads, but also for determining the depth of excavation for trenches, manholes, etc. It is equally useful for running pole lines in hilly country where it is difficult to get poles lined up by the usual method.

The instrument can be placed in the double wye support so as to serve either as a transit or as a level. Four adjustable leveling screws permit the instrument to be accurately leveled before being used. No particular skill is required in the use of the instrument. Anyone can master its operation after reading simple instructions. Figures 4 and 5 illustrate how the instrument is used.

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(Battery Eliminators)
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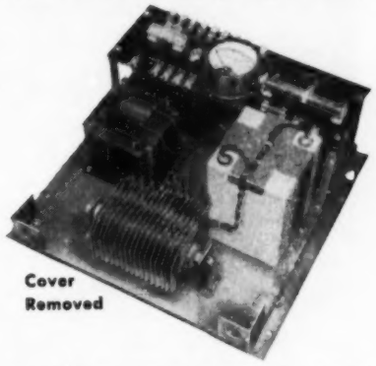
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Raytheon RectiFilteRs help you solve the problem of telephone cable shortages for PBX use.
By converting A.C. current to stabilized D.C., RectiFilteRs eliminate storage batteries. This in turn releases cable pairs, required for carrying charging current to PBX boards, for additional revenue producing service. RectiFiiteRs are efficient, compact and require no maintenance.

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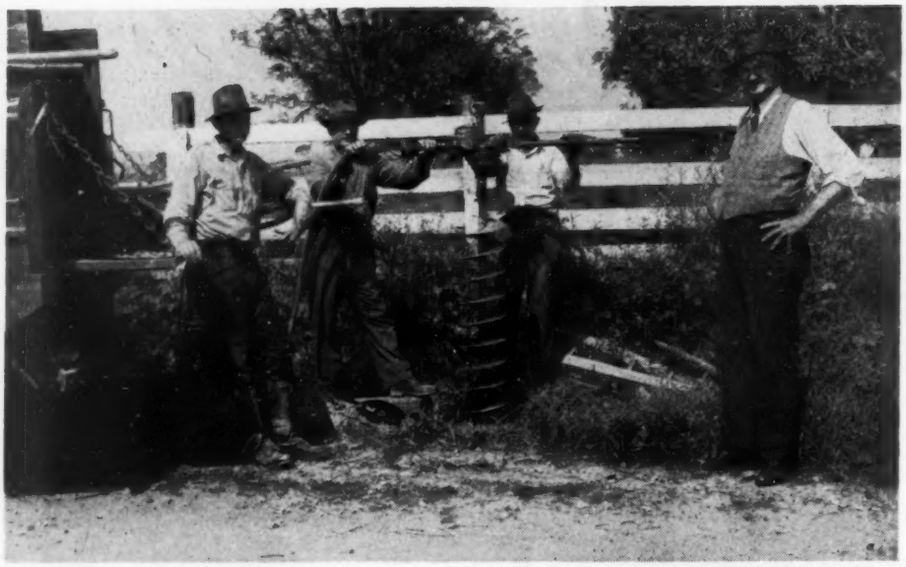
Restore and Improve The War Worn Plant

(Continued from page 44)



"Ka-Mo" compressed air, earth boring drill in operation on a Lexington (Ky.) Telephone Company job. Left to right: Curtis T. Setters, Homer F. Wagner, Cliff Epperson and C. D. Rothenburg of the Lexington Telephone Company. We understand the drill is light enough in weight for two average size men, but to Homer Wagner and Cliff Epperson, it's supposed to be like child's play. This company believe their pole setting time can be reduced from one-third to one-half the former time with this new equipment. (This photo and Fig. 10(b) courtesy Lexington's "Tele Tidings")

to obtain adequate wire and cable clearance at all road and driveway crossing points. The $5.00 saved on the height of two poles which are too short to provide adequate clearance may subsequently cost the company $10,000 due to an expensive damage suit.

Labor Saving Devices

COMPANIES which have heretofore been able to operate economically with hand digging and pole erection equipment may, in view of the currently high and constantly increasing labor costs, wish to take advantage of the labor saving features of modern construction trucks equipped with power winch and boom. A well designed modern construction truck is shown in Fig. 9-a. A smaller maintenance car that is very popular for rural line work, is shown in Fig. 9-b.

A number of companies are successfully using portable type hole diggers of the type shown in Fig. 10-b which consist of a steel earth auger and a 110 volt 60 cycle motor. It is claimed by users that the earth auger makes possible worthwhile economies in pole line construction. These motor driven augers can be used manually or they can be suspended from a winch line of a truck to lighten the labor of lifting the loaded drill from the hole being bored. Available data indicate that three men should be able to dig about 80-100 four foot holes in an 8 hour day in good soil as compared to only 30 to 35 holes per day (3 men) with a shovel. Fig. 10-a shows a large high speed truck mounted digger useful for larger projects.

Fig. 10(a)—Truck mounted digger suitable for large projects. (Courtesy Highway Trailer Co.)

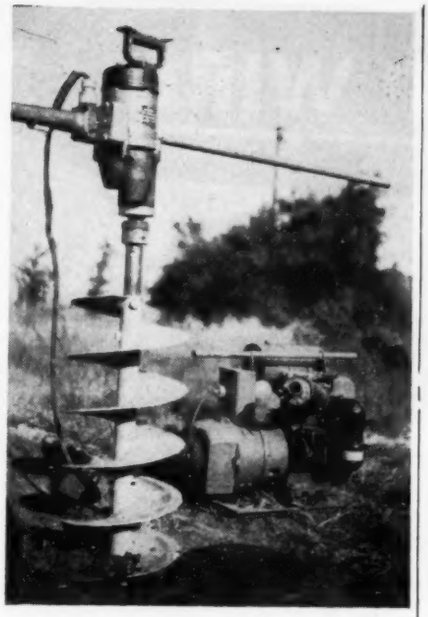


Fig. 10(b)—A portable electric earth auger in operation.

Various Uses of a Portable Power Plant

THE idea of mechanizing construction crews by means of a portable 110-volt 60 cycle generator and various electrically operated motor driven devices holds forth considerable promise for the future. If the small construction truck is equipped with a two to three kilowatt 110 volt 60 cycle unit, it would be possible to use this power source for a variety of purposes some of which might be: (1) pole hole digging, (2) anchor hole digging, (3) operation of floodlights for night emergency repairs, (4) operation of electric drills in pole framing and other similar operations, (5) operation of electric tamps, (6) operation of electric winches and rewinding reels, (7) operation of electric heaters in cable splicing tents and in manholes, (8) operation of the electrically operated tree trimming tools. Some of the uses suggested are speculative and will require development work before satisfactory tools are available.

Open Wire Plant

IN the consideration of future developments in open wire plant it can be anticipated that there will be an increasing trend toward replacement of some of the heavier open wire rural leads with cable. Aerial cable suspended by the spinner method has been remarkably free from wear and crystallization at supports. This removes one of the objections that has formerly been raised against the use of rural aerial cable in rural areas, viz., excessive wear at the rings. Wear is par-

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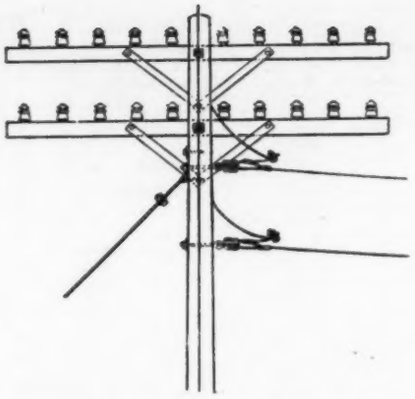

Fig. 11—One type of dead end fixture used in long span construction.

ticularly rapid in ring suspended cable in rural areas due primarily to the fact that the cable is usually of small diameter and was moved around in the rings due to the greater exposure to prevailing winds than exist in city block cable construction.

Two other factors which will tend to make rural cable more attractive are the availability of loading coils from Independent manufacturers and the trend toward high efficiency anti-sidetone sets in rural areas with their substantially greater transmission gains which will tend to offset the relatively high loss of cable circuits.

Long Span Construction

LONG span construction for rural lines will find some use in various sections of the country but opinion seems somewhat divided as to the savings made possible by this type of construction. Although long span construction is sound from a plant engineering standpoint, irregular terrain and the necessity for providing clearance into fields, driveways, etc., combine to make this type of construction impractical in many areas.

Much greater care must be taken in the design of long span plant than for

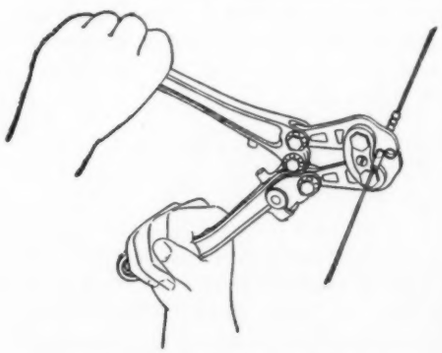

Fig. 12—Compression splicing tool (courtesy National Telephone Supply Company).

Table No. 2—*Sag Tables For High Tensile Strength Wire Used in Long Spans*

LIGHT LOADING DISTRICT

Span	Temperature — Degrees Fahrenheit							
	100	90	80	70	60	50	40	30
	Sag — Inches							
300	21	20	18½	17½	16½	15½	14½	14
310	22½	21	20	18½	17½	16½	15½	15
320	24	22½	21	20	19	18	16½	16
330	25½	24	22½	21	20	18½	18	17
340	27	25½	24	22½	21	20	19	18
350	29	27	25	24	22½	21	20	19
360	30½	28½	26½	25	23½	22½	21	20
370	32	30	28	26½	25	23½	22½	21½
380	34	31½	30	28	26½	25	23½	22½
390	35½	33½	31½	29½	27½	26½	25	23½
400	37½	35	33	31	29	28½	26	25
410	39½	37	34½	32½	30½	29	27½	26
420	41½	38½	36½	34	32	30½	29	27½
430	43½	40½	38	36	33½	32	30	29
440	45½	42½	40	37½	35½	33½	31½	30
450	47½	44½	41½	39	37	35	33	31½
460	50	46½	43½	41	38½	36½	34½	33
470	52	48½	45½	42½	40	38	36	34½
480	54	50½	47½	44½	42	39½	37½	36

MEDIUM LOADING DISTRICT

Span	Temperature — Degrees Fahrenheit								
	100	90	80	70	60	50	40	30	20
Length Feet	Sag — Inches								
350	35	33	31	29	27½	26	24½	23½	22
360	37	35	33	31	29	27½	26	24½	23½
370	39	37	34½	32½	31	29	27½	26	25
380	41	39	36½	34	32½	30½	29	27½	26
390	43½	41	38½	36	34	32	30½	29	27½
400	45½	43	40½	38	36	34	32	30½	29
410	48	45	42½	40	38	36	33½	32	30½
420	50	47½	44½	42	40	37½	35½	33½	32
430	52½	50	47	44	42	39½	37	35½	33½
440	55	52	49	46	43½	41	39	37	35
450	57½	54½	51	48	45½	43	40½	38½	36½
460	60	57	53	50	47½	45	42½	40	38

HEAVY LOADING DISTRICT

Span Length Feet	Temperature — Degrees Fahrenheit									
	100	90	80	70	60	50	40	30	20	10
	Sag - Inches									
250	21⅓	20	19	18	16½	15⅓	14⅓	14	13	12⅓
260	23	22	20⅓	19	18	17	16	15	14	13½
270	25	23⅓	22	21	19½	18	17	16	15	14½
280	27	25	24	22	21	19½	18	17½	16½	15½
290	29	27	26	24	22⅓	21	20	19	18	17
300	31⅓	29	27½	25⅓	24	22½	21	20	19	18
310	33½	31	29	27	25½	24	22½	21	20	19
320	36	33	31	29	27	25½	24	23	21½	20½
330	38	35	33	31	29	27	25½	24	23	22
340	40	37½	36	33	31	29	27	25½	24½	23
350	43	39½	37	35	32½	30½	28½	27	26	24½

spans of normal length. Failure to provide adequate sag, poles of proper strength and strong terminating fixtures can easily result in extensive damage during a major storm due to the enormous stresses which develop in the long spans.

Table No. 1 gives basic data for various types of long span lines in the three loading districts. The sag requirements for long span construction are given in Table No. 2.

The strain insulator type of dead end fixtures shown in Fig. 11 are desirable in connection with long span construction.

Splicing Tools

INDEPENDENT supply houses are once again able to supply tools in quantity and many small companies that are still splicing wire by hand will now be able to swing over to the compression type of sleeve. The many advantages of compression sleeves are too well known to require elaboration here. Two types of tools are in general use in the Independent field for making compression sleeves in open wire. Fig. 12 shows the straight compression type of tool, and Fig. 13 the rolled type sleeve compression tool. The appearance of a typical compression joint is shown in Fig. 14.

Splicing of drop wire by means of compression sleeves is of equal importance to that of open wire. Drop wire splicing is substantially faster by the compression method and insures low resistance, mechanically strong joints.

Pole Line Guying

SO MUCH has been said about the necessity for adequate guys that a writer hesitates to say anything further on this subject. But in spite of the volumes that have been written on the necessity for proper and adequate guying there still are those that feel that a good guy is merely a wire from the top of the pole to any old anchor that happens to be handy. The fundamentals of good guying are simple, viz:

(1)—Always have an adequate lead-height ratio. The stress developed in an anchor with an L-H ratio of 0.25 and with a 1000 pound pull at the top of the pole is 4,132 pounds (see Fig. 15). If this same anchor is moved further away from the base of the pole so as to give a lead-height ratio of 1.0 the stress on the anchor is only 1,114 pounds. Every effort should be made to get an L-H ratio of 1.0 or better.

Table No. 3—*Holding Power of Typical Anchors*

Anchor Size	Holding Power in Pounds			
	Swamp	Sand	Clay	Hardpan
4"	800	1,000	2,000	3,000
6"	1,500	2,500	3,500	4,000
8"	4,000	6,000	7,500	8,000
10"	8,000	10,000	11,500	12,000

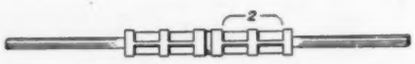

Fig. 14—Typical compression type joint and open wire (courtesy National Telephone Supply Company).

(2)—Anchors should be adequately large in holding capacity for the load which they are called on to carry. A four inch anchor may slip or pull out when used on an eight inch anchor load.

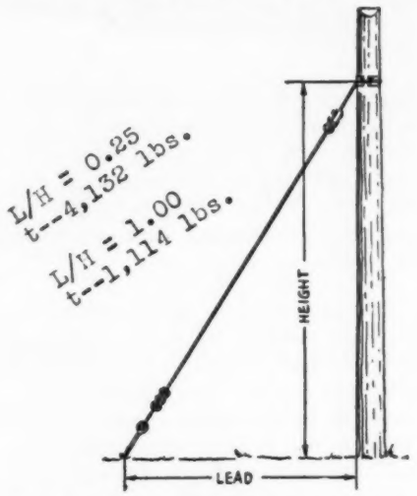

Fig. 15—Effect of lead-height ratio on stress on anchor.

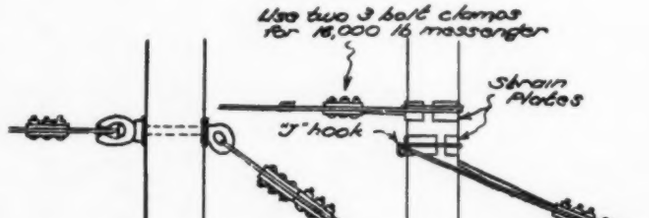

Fig. 16—New and old methods of dead ending strand.

Fig. 13 — Compression Splicing tool (courtesy James R. Kearney Corp.)

Poles out of line and slack wire, if not a wrecked lead, are the penalty for using a pee-wee size anchor for holding a king-size load. When in doubt use the larger anchor. The holding power of various types of anchors is shown in Table No. 3.

There is an old expression "be not the first to try the new nor yet the last to lay the old aside" or words to that effect. Some plant managers are evidentally taking this bit of wisdom too literally for they are still using the *wrap method* of attaching guy wires to poles, and they are pulling up guys with block and tackle in place of the compact efficient one man chain

Fig. 17—Use of chain hoist for pulling up guys.

hoist now available. The eyebolt method (see Fig. 16) of dead ending has proven itself the world over and should now be standard practice with the smallest to the largest exchanges. Fig. 17 illustrates how one man using the chain hoist can do the work of several men with block and tackle.

Conclusion

THE foregoing paragraphs have dealt with various more or less unrelated phases of outside plant construction. They have intended to point out certain needs for standardization in the smaller exchanges. Along this same line and in conclusion we might recommend for the consideration of the small and medium sized single unit exchange managers a forward looking program which will have as its purpose the standardization of plant methods; improvement of service; and the more efficient utilization of manpower. Such a program would require action along the following lines:

(1)—Getting properly equipped with adequate tools and material to turn out good telephone construction in minimum of time.

(2)—Becoming familiar with the latest and most efficient construction methods by visits to larger exchanges and by careful attention to construction articles in the trade magazines.

(3)—Preparation of rehabilitation and long term plans for plant reconstruction and maintenance.

(4)—Creating a good construction crew capable of carrying out the plans prepared.

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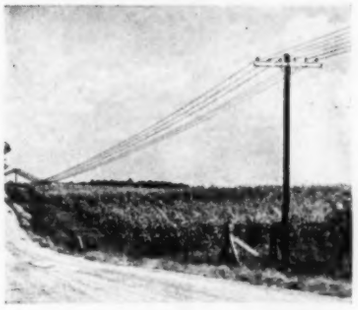

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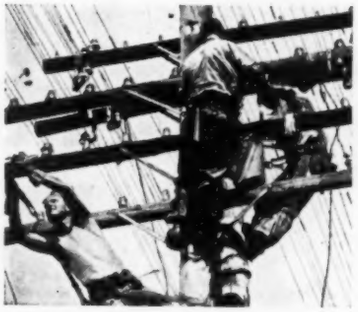

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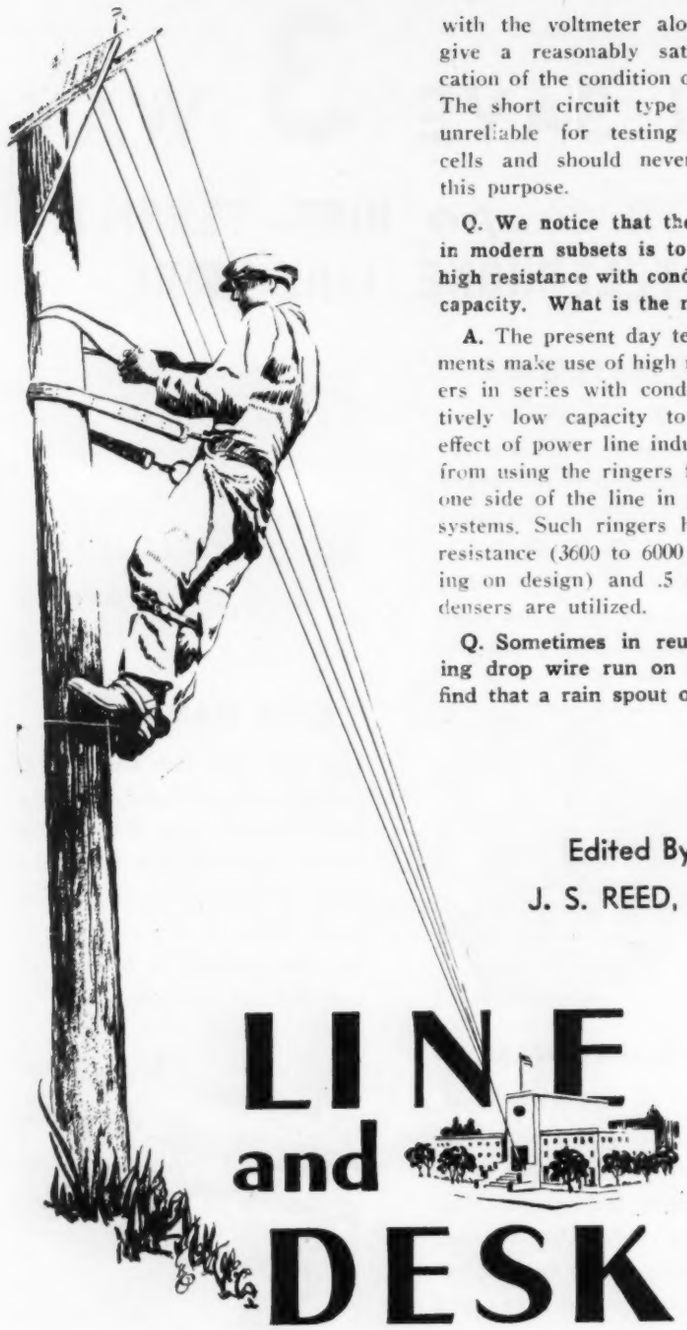

Edited By
J. S. REED, JR.

LINE and DESK

Q. How can we properly test dry cells? We are told that a special voltmeter would have to be used for this purpose, but they are not easy to get.

A. An ordinary voltmeter of 0 to 5 volts may be used for testing dry cells if a resistance of six ohms is connected across the voltmeter terminals during the test. If the voltage drops to the cut-off point of .93 volt per cell within one minute, the cell is unfit for further use and should be replaced. A simpler test would be to take the receiver off the hook and allow the transmitter current to flow for at least one minute before taking the reading with the voltmeter alone. This will give a reasonably satisfactory indication of the condition of the dry cells. The short circuit type of ammeter is unreliable for testing telephone dry cells and should never be used for this purpose.

Q. We notice that the present trend in modern subsets is to use ringers of high resistance with condensers of small capacity. What is the reason for this?

A. The present day telephone instruments make use of high resistance ringers in series with condensers of relatively low capacity to minimize the effect of power line induction resulting from using the ringers from ground to one side of the line in ground ringing systems. Such ringers have high d. c. resistance (3600 to 6000 ohms, depending on design) and .5 to .2 m.f. condensers are utilized.

Q. Sometimes in reusing an existing drop wire run on a building, we find that a rain spout or electric light conduit has been installed across the run without properly protecting the wire. How can we place flexible loom on the wire without cutting or taking the wire out?

A. Use a short piece of split loom to protect the drop wire where it comes in contact with the pipe or conduit. Slit the loom lengthwise with a sharp knife and place it over the wire. Tape the loom with a single layer of tape. Slide the loom along the wire and back of the obstruction. Hold the ends of the loom in place on the wire by taping or by means of "C" type split knobs as shown in Figure 1.

Q. In redecorating operators' rooms, we have been cautioned not to use turpentine in the paint. What is the reason for this precaution?

A. Turpentine and other thinners utilizing a gum base are unsafe for use in paint employed in refinishing central offices, particularly in rooms where relay equipment is located. This is because the fumes from the turpentine tend to deposit a gummy substance in relay springs and armatures that may result in relay failure.

Q. What are the important steps that should be taken to keep central office equipment in good shape?

A. We believe that the following simple rules will enable the average central office to maintain a high standard of efficiency:

1. Make routine tests of all cord circuits at regular and frequent intervals. In common battery exchanges make current flow tests on relays at less frequent intervals.
2. At the time of the periodic test of cord circuits, polish all switchboard cords and repair or replace worn or otherwise defective cords.
3. Check all operators' headset equipment at regular intervals and have them cleaned. Keep extra headsets on hand to replace defective units and have the latter replaced promptly.
4. Keep all equipment clean. Do not permit dust to accumulate in key pans, cord pits, in the rear of switchboards and in equipment cabinets. See that relay covers are fastened in place and that the switchboards and cabinets are closed to exclude dust.
5. Do not permit any fume-producing materials to be left inside the central office and do not allow steel wool or emery cloth or paper to be used in the office since these materials may get in relay equipment and interfere with their operation.
6. Have adequate and up-to-date circuit prints and specifications on hand for reference when needed.
7. See that the maintenance force has adequate tools of the proper type for the repair jobs and that the men are familiar with the proper procedure to follow in clearing trouble as well as in routine maintenance of the office equipment.

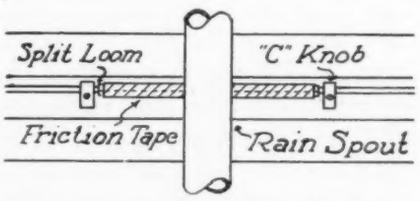

Fig. 1—Use of split loom to protect drop wire running past rain spout.

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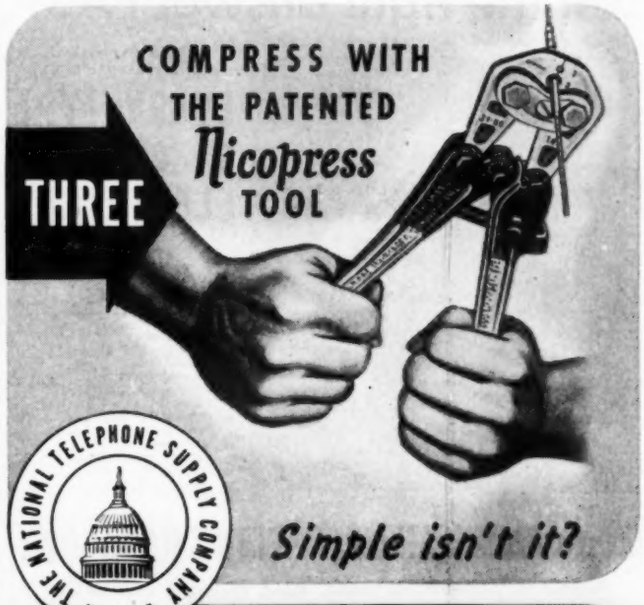

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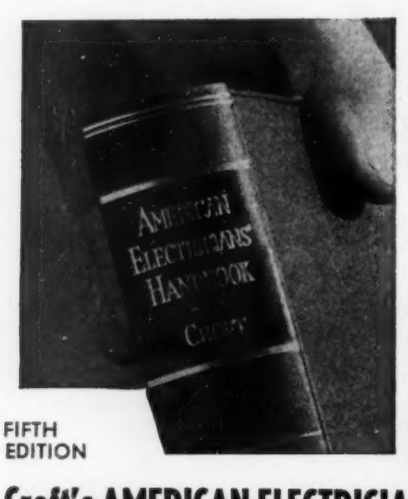

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General Harrison Retires From Army; Honored for Outstanding Supervision Of $7 Billion Signal Corps Procurement

FOR his outstanding and successful direction and supervision of the tremendously vital Signal Corps communications-radio-radar procurement task—one that superimposed in one war year a $3 billion military production load on an industry which prewar had only an annual output of $250 million, Major General William Henry Harrison, Chief of the Signal Corps Procurement and Distribution Service, has received the Distinguished Service Medal with a personal presentation by General Brehon B. Somervell, Commanding General of the Army Service Forces.

The receipt of the DSM marked one of the final official actions of General Harrison before he retired voluntarily from the Army to an inactive duty status.

General Harrison was replaced in his post as Chief of the Signal Corps' Procurement and Distribution Service in official War Department orders Sept. 1 by that service's deputy chief, Brigadier General Edgar T. Clewell.

General Harrison is now on terminal leave. When he became head of the Signal Corps Procurement and Distribution Service on July 9, 1943, General Harrison resigned from the vice presidency in charge of the operations and engineering department of the American Telephone and Telegraph Company which he had occupied since 1938. He had risen to the vice presidency after having started as a repairman in 1909 with the New York Telephone Co. at the age of 17 and after having taken night engineering courses. He had served successively with the Western Electric (1914-18), A. T. & T. (1918-33 and 1937-42) and Bell of Pennsylvania (1933-37).

The conferring of the Distinguished Service Medal upon General Harrison was an unusual tribute because rarely at any time in the history of the Army has the DSM, the Army's third highest decoration, been given to commanders of supply or technical services stationed in the United States. The DSM for officers directing procurement programs is not only most difficult of attainment but is nearly always confined for overseas service.

Under the leadership of General Harrison, the Signal Corps procurement and production activities established one of the outstanding records of any supply branch of the Army. Particularly in the distribution of supplies were the achievements of the Signal Corps brilliant. Shipments were made 24 hours after the demand for the requirement had been received by the Signal Corps. This is a record which has not been equalled by any private business concern such as Sears Roebuck, Montgomery Ward, etc. it is understood. In the Battle of the Bulge when the American and British armies so desperately needed communications supplies, the Signal Corps was accorded the highest praise—and achieved a better record than any other supply service—from the commanders of the fighting forces.

A major contribution to the successful consummation by the Signal Corps in its procurement and distribution objectives came from the close cooperation and relationship between the Corps and the communications-radio-electronics manufacturing industries. General Harrison through his entire Signal Corps career concentrated on achieving this close friendly liaison with the manufacturing companies so that the Signal Corps headquarters staff could give all the aid and help possible to fulfill the tremendous production load.

Used Over 5,000 Prime Contractors

THIS cooperation between the industry and the Corps was believed to have been greatly implemented by the continuous tours and visits to plants by General Harrison who thus was able to aid manufacturers on the spot with directives and actions to solve bottlenecks and other problems.

During his guidance of the Signal Corps procurement program, General Harrison held the reins over production amounting to approximately seven billion dollars. Around 5,000 prime contractors were used by the Signal Corps, including numerous small companies, and the prime contractors used very many thousands of sub-contractors.

Inspections of Fighting Fronts

BESIDES his very frequent trips to Signal Corps camps and installations and contractors' factories in this country, General Harrison made two extensive tours of the combat theatres. In 1942 and 1943 he inspected the ASF activities in the Asiatic North African and Mediterranean theatres. In 1944 General Harrison made an extended inspection of the Signal Corps procurement and distribution activities in England, Normandy, France and Italy.

General Harrison carried the Signal Corps Procurement and Distribution Service through three phases. The first

was when the U. S. Army and United Nations' forces were short of signal supplies and he concentrated on procurement which resulted in the mushrooming of the American industry into a production capacity 12 times its prewar size; the second, the intensification of distribution and the standardization of equipment so as to be interchangeable with that of the Navy and other United Nations' forces; and, then in a most foresighted manner ahead of the other branches of the Army in the planning and execution of Contract Termination and Settlements.

The Signal Corps P. & D. Service had in the continental United States fourteen Signal Depots and Signal Sections of ASF Depots with the Philadelphia Signal Depot as the largest. In addition to the Depot and Procurement District activities, the Service included a number of others, such as the Stock Numbering Agency, the Storage and Issue Agency, and the Signal Corps Inspection Agency. The service personnel at its peak comprised more than 30,000 civilians and approximately 1,500 officers at its establishments in this country.

Before he took over the Signal Corps Service, General Harrison had served for a year with the ASF headquarters, entering the Army in June, 1942 as a Colonel; in the same month being elevated to Brigadier General; and in June 1943 being promoted to Major General. General Harrison first came to Washington in the emergency period before Pearl Harbor in 1940 where he served as director of the Construction Division of the National Defense Advisory Commission, on leave from the A. T. & T.; in 1941 he became chief of the Shipbuilding Construction and Supplies Branch of the Office of Production Management; and in 1942 was Director of the WPB Production Division.

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Telephone Central Installed in Trailer

Signal Corps telephone men encountered special field conditions in the Pacific area which called for modification of procedures that are effective in more highly developed areas like Europe. One company found it much more practical to construct and install telephone centrals in 1-ton trailers than in 1½-ton or 2½-ton trucks. The men often have to make their way over swamps or up steep slopes that no truck can negotiate, whereas the trailer can be pulled by almost any type of vehicle.

The trailer used is an ordinary 1-ton metal body trailer which they have altered slightly to meet their needs. Alterations include reinforcing the body with strap iron and raising the roof 8 inches. This latter change has necessitated, in turn, sewing extensions on the canvas top.

Between their telephone installation and the construction center they run a ten-pair and a five-pair cable. This ordinarily handles trunk lines, but if more than 15 pairs are needed, they run field wire or another five-pair cable.

When they arrive in an area ready to set up, they drop all of their cable stubs out of the bottom of the trailer. These are already wired to the frame and a convenient form of termination. Consequently all work is done from outside the trailer. No one has to remain inside except the switchboard operator.

All trunk lines go through repeating coils. The center taps of these go to the terminal strip on the side of the trailer and also terminate in three five-pair stubs which are dropped out of the bottom of the trailer. All of the lines are automatically simplexed (incoming trunks), so mix-ups seldom occur.

Brig. Gen. Bickelhaupt Vice President of AT&T

Brigadier General Carroll O. Bickelhaupt, well known to Independent telephone people as former vice president of American Telephone & Telegraph Company, has returned to civilian status after four years' Army service and has been elected vice president and secretary of A.T.&T.

Brig. Gen. Carroll W. Bickelhaupt

General Bickelhaupt was awarded the Legion of Merit and the Bronze Star Medal. He was also cited in orders of the French Army for the Croix de Guerre with palms.

He succeeded R. H. Strahan as secretary, who resigned because of ill health.

Gary Group Now Operates Middle States Utilities

Management and control of Middle States Utilities Incorporated (formerly Middle States Utilities Company) are now in the hands of the Theodore Gary and Company organization, more commonly known as the Gary Group, as a result of confirmation of the plan of reorganization. Announcement to this effect was made recently by Hunter L. Gary, chairman of Gary Services and Investment Company, service agency for the Gary Group of telephone operating and manufacturing companies. The Middle States company is holding company for important telephone operating properties in Missouri and Iowa.

The plan of reorganization, approved by the bondholders and preferred and common stockholders of the parent company, was submitted to the U. S. District Court, Western District of Missouri in the early part of this year, and confirmed by that court on May 28, 1945. The plan, as confirmed, included the change of name to Middle States Utilities Incorporated and appointment of the following as the new board of directors: V. E. Chaney, R. R. Coffman, Clyde H. Evans, Hunter L. Gary, and Martin Lindsay.

The telephone operating companies controlled by Middle States Utilities Incorporated comprise the following:

Middle States Utilities Company of Missouri, operating 21 exchanges in Missouri, serving approximately 7200 subscribers.

Middle States Utilities Company of Iowa, operating 22 exchanges in southern Iowa, serving approximately 5000 subscribers.

Clinton County Mutual Telephone Company, serving approximately 1200 subscribers in eight exchanges in Missouri.

Andrew County Mutual Telephone Company, serving approximately 2200 subscribers in nine exchanges in Missouri.

With its background of more than thirty-five years of broad practical experience in the operation of telephone properties, the Gary Group is well fitted to undertake the management of this group of exchanges and to solve the many problems resulting from wartime conditions.

Cook Contributes in Atomic Bomb Equipment

The laboratories of Cook Electric Company, Chicago, were revealed by Walter C. Hasselhorn, president, as another Chicago participant in the production of equipment involved in processing of materials for the atomic bomb which has been used against Japan. Some of the devices developed by Cook engineers and technicians at the request of, and in cooperation with government-designated engineers and scientists, were devices which had no prototypes in the field of material processing equipment. All such work was conducted in the greatest secrecy at the company's Chicago laboratories in a special section under augmented military guard beyond that already required by the Military Security Forces or protection of other war work areas. Personnel of the company's facilities did not know the nature of the developments nor the ultimate use of the equipment being developed, Mr. Hasselhorn said.

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P&H "STILL IN THE LEAD"

Charge WAGE EXEMPTION Abrogated

By ROLAND C. DAVIES

THE National Telephone Commission of the National War Labor Board exceeded its jurisdiction in awarding wage increases to switchboard operators employed in exchanges of less than 500 stations of the Upstate Telephone Company, the leading Independent company serving upstate New York, the two Industry members of the Commission vigorously asserted in a dissenting opinion. The National Telephone Commission did not abide by the limitations of the Fair Labor Standards Act which exempts operators in exchanges of less than 500 stations from the application of the minimum wage of 40 cents an hour.

This challenge of failing to abide by the Fair Labor Standards Act, which was contained in the dissenting opinion of the Commission Industry members—Burton W. Saunders, Vice President and General Manager of the Indiana Associated Telephone Co., and G. K. McCorkle, Vice President of the Illinois Bell Telephone Co., both Substitute Industry members—, was regarded as one of the most significant developments in the deliberations of the NWLB Telephone Commission. The dissenting opinion was issued Sept 8, more than a month following the issuance of the Commission's decision on Aug. 1, in which the Commission awarded wage increases ranging from five cents an hour in the starting rates to fourteen cents an hour at the maximum rates, depending on location of the exchange and the time required to reach the maximum rates. The progression schedules which the company had varied from ten to fifteen years and the Commission reduced the schedules so that the maximum wage rates could be attained in three to eight years.

The Upstate Telephone Co. operates 36 exchanges, of which four employ switchboard operators servicing less than 500 stations. In addition, twelve of the exchanges have unattended, automatic dial operation and do not have switchboard operators.

IN their dissenting opinion, Messrs. Saunders and McCorkle took vigorous exception to an opinion of July 13, 1945, of the NWLB General Counsel to the Commission which stated that the Fair Labor Standards Act does not limit the Board's jurisdiction in directing wage increases even though the Act makes specific exception to the minimum wage provision. This opinion was rendered, incidentally, to the National Telephone Commission Chairman Pearce Davis. (The same issue occurred over a year ago in the case of a Regional Board decision in regard to three small exchanges of less than 500 stations of the Illinois Commercial Telephone Co., an affiliate of the General Telephone System.)

Burton W. Saunders

The dissenting opinion declared that the increases ordered by the Telephone Commission for operators at exchanges with 500 or less stations are "unlawful in that they deprive the company of exemption from wage and hour provisions of the Fair Labor Standards Act." It was pointed out that the majority of the Telephone Commission, in their decision assuming jurisdiction over the wages of these small exchanges, were of the opinion that the question of overtime pay to switchboard operators in such exchanges is a related question.

"The mere fact," the dissenting views of the two Industry members stated, "that the National War Labor Board would be deprived of jurisdiction over a segment of American industry if excluded from jurisdiction with respect to switchboard operators employed in telephone exchanges serving less than 500 stations does not give the Board the right to overrule the intention of Congress. It is believed therefore, that the wage rates and overtime payments ordered by the National Telephone Commission for such exchanges are unlawful in that they deprive the Company of exemption from the wage and hour provisions of the Fair Labor Standards Act, an exemption given through the considered judgment of Congress by means of an amendment to the Act."

The Commission also violated the provisions of the War Labor Disputes Act, the Industry members asserted, in that the Board is "specifically admonished against interfering with the operation of the Fair Labor Standards Act."

THE effect of the directive order is to nullify absolutely the exemption in the Fair Labor Standards Act, the dissenting opinion emphasized. "While the directive order in this case is applicable only to the Company immediately involved," the dissenting opinion continued, "it may be assumed that the principle laid down will find application in other cases that may yet come before the Commission. Thus, other companies in the same (telephone) industry will be affected.

"It may be pertinent to recall here that the Upstate Telephone Corporation of New York is a so-called Independent company. 'Independent' is the name ordinarily applied to a company

which is not part of the American Telephone and Telegraph Company system. In the United States, there are several thousand Independent companies. They operate mainly in the small towns and in the rural areas It was undoubtedly the peculiar economic conditions surrounding small town telephone operations which induced Congress to grant, in the Fair Labor Standards Act, the relief which exempts switchboard operators at exchanges having less than 500 stations from the wage and hour provisions of that Act.

"It is a matter of which this Commission has the right to take judicial notice that conditions surroundig the carrying on of any business in a small town may well differ from those surrounding the carrying on of any business in a large city. In a small community, for example, that can support a telephone exchange of only 200 or 300 or 400 customers, it is expected that living costs will be considerably less than those in metropolitan centers. This must be apparent when it is considered that in a community of such a size, people ordinarily walk to work; that vegetables and other food stuffs are frequently grown in the back yard or are available from local producers without being loaded down with costs incident to passing through intermediate hands; and that entertainments such as the movies cost less. In such a community, rents too are lower.

"Likewise, it is appropriate to refer to the fact that the revenue per customer at the small telephone exchange is less than at an exchange in a metropolitan area. At such an exchange, the Company simply does not have the revenue with which to pay wages that would be entirely proper in a larger community.

"These circumstances must have been the ones Congress had in mind when the House Committee which reported the exemption written into the Fair Labor Standards Act said: 'Small telephone companies, on the whole, are financially unable to comply with the wage provisions of the Act.'

"Administrative bodies familiar with the Independent Telephone companies have given evidence of their recognition of the different economic conditions affecting their operations."

The dissenting opinion also called attention to the fact that the Wage-Hour Administration had granted special treatment to the Independent telephone industry in regard to the establishment of learners' wage rates for switchboard operators below the minimum wage level.

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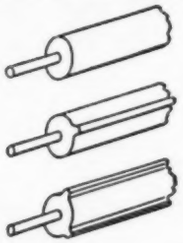

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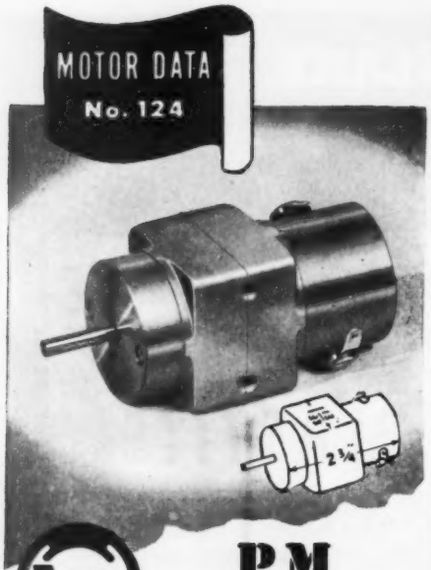

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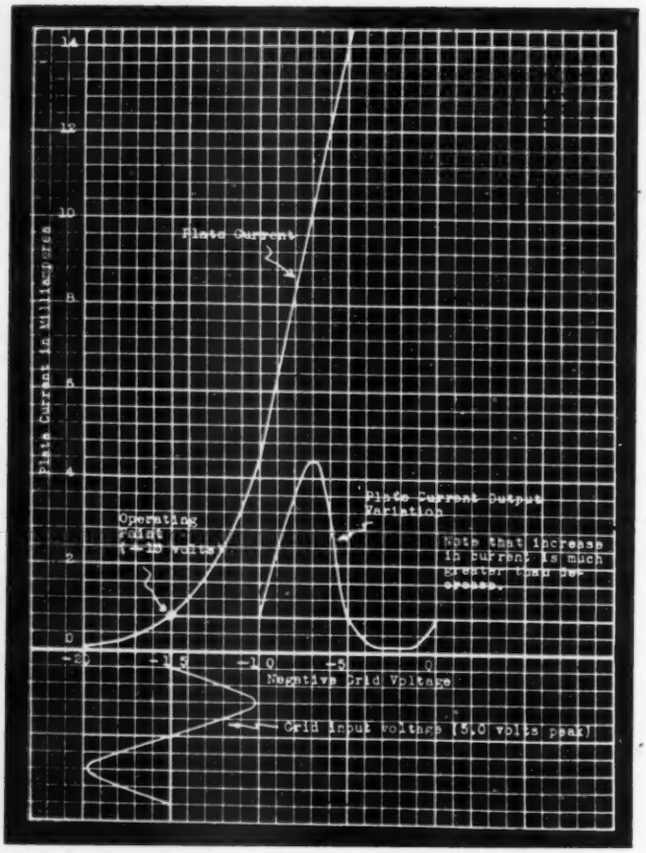

Fig. 85 — Curve showing effect of excessive bias voltage.

and very little distortion takes place. This system of amplification offers the advantage of high audio output power with small tubes and is a more efficient arrangement than class A amplification, which involves operating tubes over the straight portion of their characteristic curve. Fig. 87 illustrates graphically how the plate current from the two tubes in a class B audio amplifier combine to produce an undistorted output wave

Radio Frequency Amplifiers

RADIO frequency amplifiers do not have the same limitations with respect to the effect of grid bias voltage on distortion as to audio frequency amplifiers. For example, a radio frequency amplifying tube can be biased quite highly negative and although this does distort the radio wave passing through it, the distortion is in effect eliminated by the tuned circuits which

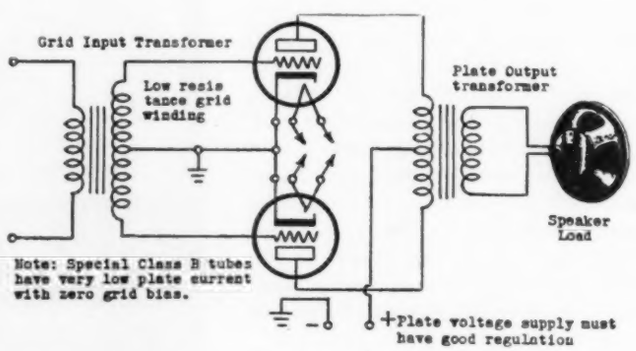
Grid Input Transformer
Low resistance grid winding
Plate Output transformer
Speaker Load
Note: Special Class B tubes have very low plate current with zero grid bias.
+Plate voltage supply must have good regulation

Fig. 86 — Circuit of class B audio stage.

are used in radio frequency amplifiers; hence the distortion is of no consequence. In radio frequency transmitters, for example, tubes are usually operated with very high negative grid bias voltages in order to produce unusually good tube efficiency. Such operation is often referred to as *Class C operation* meaning that a tube is operated at a bias voltage greatly in excess of the value required to produce zero plate current.

Types of Audio Amplifiers

AUDIO amplifiers are often classified according to method of coupling between stages or the particular circuit arrangement used.

Seven types of audio amplifiers are commonly encountered, namely: (1) transformer coupled, (2) resistance coupled, (3) impedance coupled, (4) push-pull class A, (5) push-push class B, (6) direct coupled and (7) inverse feedback. Such terms may not always be precise when applied to an entire amplifier system inasmuch as a given amplifier may use several different types of coupling in its several stages.

Transformer Coupled Stages

TRANSFORMER coupled amplifier is one which uses an iron core transformer to couple the plate circuit of one amplifying tube to the grid circuit of the following tube. *A typical transformer coupled stage* is shown in Fig 88. Transformers are used primarily with triode tubes due to their relatively low plate impedances.

Resistance Coupled Stages

RESISTANCE coupled amplifier stages are simple and inexpensive and when properly designed will produce little distortion. A typical *resistance coupled stage* and its various components are shown in Fig. 89. It will be seen that the plate of the first tube is connected to the grid of the second tube through a small condenser which is identified as C_1. The plate and grid resistors serve to keep the voltages on these elements at their proper values. Coupling between the plate and grid circuits of the two tubes takes place as a result of the plate current variations across the plate load resistor. The coupling condenser serves to isolate the plate and grid stages with respect to the d-c voltages which may be present on them.

Impedance Coupled Stages

IMPEDANCE *coupled stages* operate in much the same manner as the resistance coupled type with the exception that an impedance rather than a resistance is used in the plate circuit as is

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"... and every time a blonde goes by, it whistles! See!"

(Courtesy RADIO-CRAFT)

shown in Fig. 90. Because the impedance can have a low d-c resistance yet present a high impedance (at audio frequencies) to the plate circuit of the tube, it can operate at relatively low plate potentials. However, the resistance coupled stage is the more popular of the two because of its simplicity and greater freedom from distortion. In order for either the resistance or impedance coupled stages to operate effectively, the impedance values of the coupling components must be relatively high with respect to the plate impedance of the coupled tubes.

Push-Pull Class A Amplifying Stages

A *PUSH-PULL audio stage* utilizes two tubes of similar characteristics connected in a balanced circuit as shown in Fig. 91. The signal input voltage applied is one hundred and eighty degrees out of phase on the two grids. This causes the plate current in one tube to increase and at the same instant causes the plate current in the second tube to decrease. Hence, the term *push pull.* The grids are biased for class A operation.

Fig. 92 illustrates how the plate current of the two tubes combine in the output circuit to produce an essentially undistorted output wave. This type of amplifier has the advantage of low distortion as second harmonic distortion is cancelled in the output circuit.

Push-Push Class B Amplifier Stages

THE circuit of the Class B amplifier is similar to that of the Class A push-pull amplifier. However, it operates differently for as previously explained the grids of the two tubes carry a negative grid bias voltage of such value as

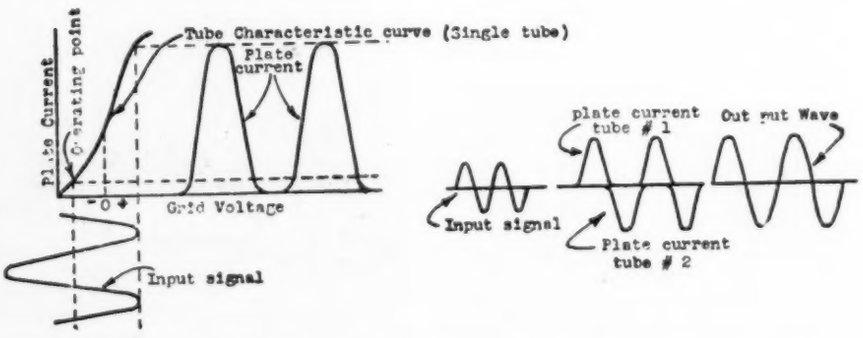


Fig. 87—Curves showing the action in a class B audio amplifier.

to reduce the plate current to almost zero. When an input voltage is applied, the plate current of each tube increases only on positive half cycles of the signal input wave. Fig. 86 and 87 show the circuit and action of a Class B amplifier.

The Direct Coupled Amplifier

A UNIQUE method of connecting vacuum tube stages in an audio amplifier is that known as the *direct coupled stage*. By this method it is possible to directly connect the plate of one tube to the grid of the following tube and yet maintain the grid at a negative potential and the plate at a positive potential with respect to their own cathodes. This is accomplished by utilizing the voltage drop along a resistance network which carries the plate current of the two tubes and by operating the cathode of one tube above ground potential. If properly designed, this type

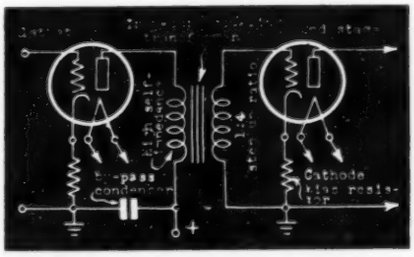


Fig. 88—Basic circuit of A transformer coupled stage.

of amplifier, has an exceptionally fine audio frequency response. However, for various reasons it has not become popular for audio purposes. It is also useful, when it is desired to amplify voltages as for example in connection with the photo cell circuit. A typical direct coupled stage is shown in Fig. 93.

The Inverse Feedback Amplifier

AN inverse feedback amplifier is an arrangement whereby energy from the output circuit of an amplifier is reintroduced into the grid circuit in such manner and phase as to stabilize the action of the amplifier and to reduce distortion. This type of amplifier is characterized by exceptionally faithful reproduction.

Frequency Range of Audio Amplifiers

IN considering the frequency range of amplifiers used for various applications the following facts should be kept in mind, viz: (1) a frequency range of 250 to 3000 cycles per second is considered adequate to transmit intelligible speech although the naturalness of the speaker's

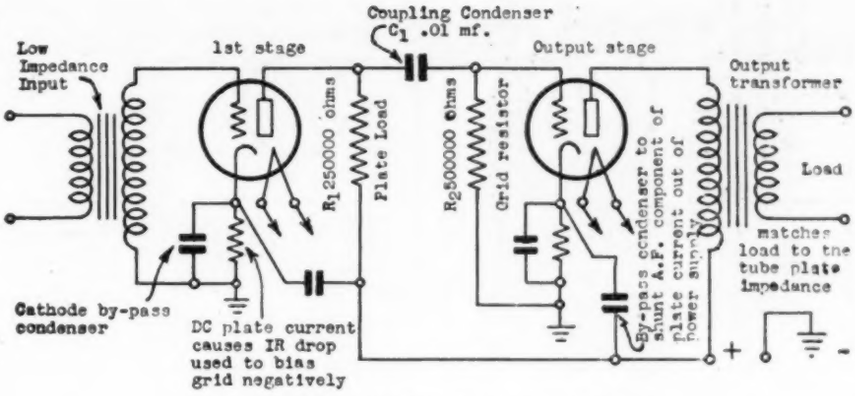
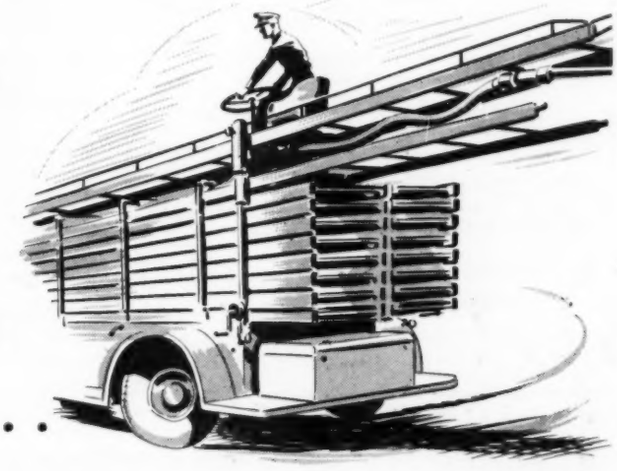


Fig. 89—Basic circuit of a resistance coupled stage.

The Guy Who Steers the Back Wheels . . .



Fire! the siren screams and the big hook and ladder outfit comes howling down the street. And there at the very end of the long vehicle he sits . . . the guy who steers the back wheels. It loks important but he has no real control over the destination of the vehicle. He's only playing follow the leader.

One of the fundamentals of sound business management is to select capable department heads and branch managers, men with the "KNOW-HOW" to get the job done right. Then they can use their own initiative and you'll get results.

The manager in a LOOMIS-operated city is in charge. He can give advertisers, the quick decisions and the on-the-spot service they need. He is a successful man with long experience in the advertising field who knows how to handle it and make it pay.

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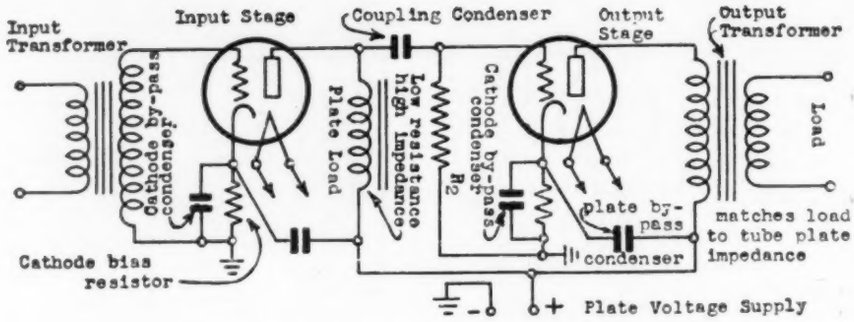

Fig. 90—Basic circuit of an impedance coupled stage.

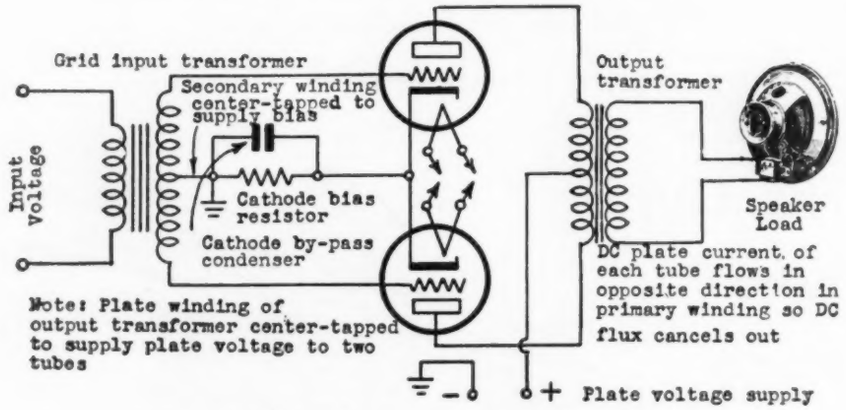
Grid input transformer
Secondary winding center-tapped to supply bias
Output transformer
Input voltage
Cathode bias resistor
Cathode by-pass condenser
Speaker Load
DC plate current of each tube flows in opposite direction in primary winding so DC flux cancels out
Note: Plate winding of output transformer center-tapped to supply plate voltage to two tubes
+ Plate voltage supply

Fig. 91—Basic push-pull class A audio amplifier circuit.

voice may be partially lost if confined to this range, (2) For transmission of speech and music with good fidelity a frequency range of approximately 60 to 5000 cycles is required, (3) For the transmission of exceptionally high quality speech and music a band of fifty to fifteen thousand cycles is desirable.

Experiments conducted by one of the large laboratories has shown that even if all frequencies below 700 cycles and above 2000 cycles are cut off or eliminated it would still be possible to carry on an understandable conversation, but of course the voice does not sound natural and has a "tinny" high pitched sound. The characteristics of most telephone channels used for ordinary telephone purposes are such that the frequency bands normally employed extend from about 250 to 3000 cycles.

It is also interesting to note the major part of the energy in speech is largely found in the frequencies below 500 cycles.

(Part 1 of Chapter 7 will appear in the October 1 FORTNIGHTLY TELEPHONE ENGINEER.

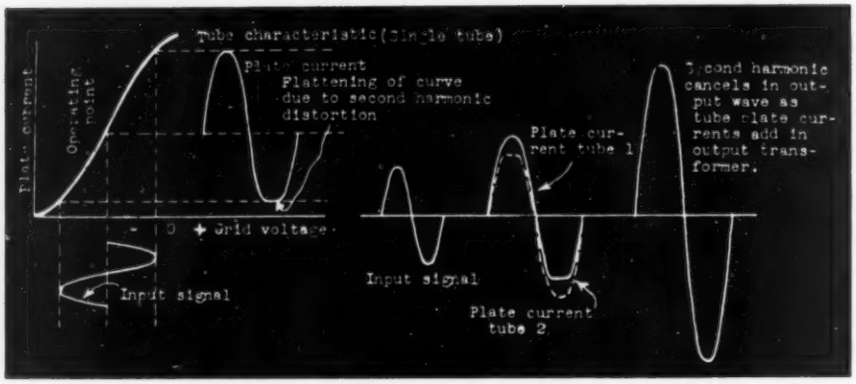
Tube characteristic (Single tube)
Plate current
Operating point
Plate current
Flattening of curve due to second harmonic distortion
Plate current tube 1
Second harmonic cancels in output wave as tube plate currents add in output transformer.
- 0 + Grid voltage
Input signal
Input signal
Plate current tube 2

Fig. 92—Curves showing how the plate currents of a push-pull audio amplifier combine in the output circuit.

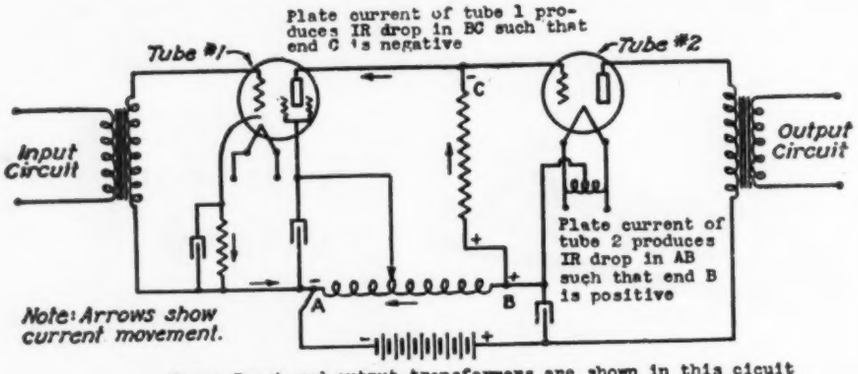
Plate current of tube 1 produces IR drop in BC such that end C is negative
Tube #1
Tube #2
C
Input Circuit
Output Circuit
Plate current of tube 2 produces IR drop in AB such that end B is positive
A
B
Note: Arrows show current movement.

Note: Input and output transformers are shown in this cicuit for PP operation. For DC use, dispense with input transformer and substitute relay for output transformer

Fig. 93—A direct coupled amplifier stage.

Examination Questions

Chapter 6—Basic Theory of Vacuum Tube Detectors and Amplifiers

1. Why must a radio wave be demodulated (detected)?
2. Will the same type of detector circuit work on both an AM and an FM radio signal?
3. Explain the action of a simple crystal detector circuit.
4. Does a diode detector supply any amplification to the signal which it detects?
5. Why must the grid of a "plate circuit method" detector tube be maintained at a negative voltage?
6. State briefly the basic difference in the function of the detector used with an AM radio receiver, and the discriminator-detector used in an FM receiver.
7. Explain briefly the manner in which a triode tube operates as an amplifier.
8. What is the effect of excessive negative bias on a single tube Class A audio amplifier?
9. Explain the basic difference between the action in a Class A Push-Pull amplifier and a Class B Push-Pull amplifier.
10. What is the purpose of the coupling capacitor in a resistance or impedance coupled audio amplifier stage?

Mail all examinations direct to Lincoln Engineering School—Box 931—Lincoln, Nebraska. Include 6c in stamps to cover return mailing costs.

Automatic Appoints M. L. Markey As So. Calif. Representative

Simultaneously with the appointment of J. H. Hazlett as manager of Automatic Telephones Limited of Brazil, Automatic Electric Sales Corporation has announced that M. L. Markey, formerly engineer in the Company's Columbus office, has become service representative for southern California, replacing Mr. Hazlett, effective September 1, 1945. Mr. Markey will make his headquarters in Los Angeles.

M. L. Markey

Mr. Markey is a graduate of Cornell University, where he received his E. E. degree in 1928. After leaving school, he spent two years in the employ of the New York Telephone Company, joining Automatic Electric Company in 1930. After taking the Company's training course, he was assigned to the installation department where he spent some months as student installer. Returning to Chicago in 1932, he divided his time between the sales and engineering organizations while working on special customer service assignments.

In 1936, Mr. Markey was assigned to the Cleveland sales office as engineer, and shortly after the outbreak of the war went to Columbus where he has since worked closely with the Army Air Forces and other branches of the armed services as field engineer on government orders for communication and other wartime equipment.

Free Safety Program

A specific program designed to help industry meet the threat of an increased accident toll under the changed conditions of the postwar period has just been offered by 38 national organizations interested in industrial safety.

The program is contained in a 16-page pamphlet, "Industrial Safety Tomorrow," produced by the National Safety Council for the cooperating organizations. The sponsoring organizations include industrial, management Associations, labor unions, civic organizations, educational institutions and insurance associations.

Preparation of the pamphlet was handled by a special Committee on Post-War Industrial Safety, headed by C. R. Cox, president of the National Tube Company of Pittsburgh, Pa., a subsidiary of the U. S. Steel Corporation.

The pamphlet can be obtained without cost from the National Safety Council, Chicago 6, Illinois.

Invasion of Territory Alleged

The Minnesota Railroad & Warehouse Commission has ordered a public hearing on October 9 of the complaint filed by Mrs. Clarence Goertz, alleging invasion by the Hammond (Minn.) Telephone Exchange of the Bremen Party Line (Millville, Minn.) Telephone Company's territory which resulted in the Bremen Company being unable to serve her farm home.

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Easily Installed

. . . and quiet in operation. Made in 6 models to carry loads ranging from small PBX to large Central Office Installations.

Produces Ringing Current

. . . both powerful and uniform assuring the efficient operation of your signaling service.

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LORAIN, OHIO

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Quality WIRE
for Every
Telephone NEED

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GROUND
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CABLE TERMINAL
INSTRUMENT
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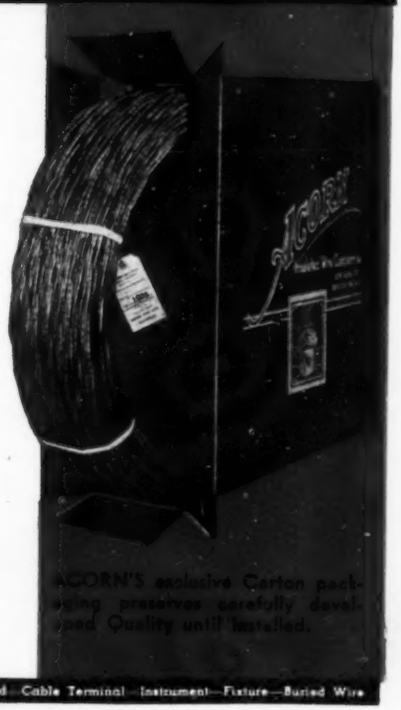

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ACORN INSULATED WIRE COMPANY, INC.
225 King Street, Brooklyn, N. Y.
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

Girl Saves Chief Switchman

S. Ralph Davis, chief switchman at the Peninsular Telephone Company at Lakeland, Fla., probably owes his life to the fact that Martha McAlister remembered what she learned three years ago in her high school first aid course.

Martha McAlister

Davis was overcome recently by fumes from a gasoline driven portable generator operating in a small garage back of the telephone building. The generator was being tested for emergency use and both the door and the window of the garage were open. Overcome by the fumes, Davis fell unconscious just inside the door.

Miss McAlister, Miss Gloria McCrain Braine and Leonard Mowiser, all telephone company employees, worked together in pulling the blue-faced, unconscious Davis into the open. Miss McAlister promptly applied artificial respiration for nearly 30 minutes before a physician arrived.

Davis was taken to a hospital and kept under medical observation for a few days.

$300,000 Construction At Stromberg-Carlson

The Stromberg-Carlson Company of Rochester, N. Y., began construction on August 20, of a new $300,000 building alongside its main plant.

The building will have a capacity of 60,000 square feet and will be used for the manufacture of chassis for radio and television sets.

Stromberg-Carlson was one of the nation's ten top producers of radar equipment during the war, and now is well into peacetime production of radios and telephones.

Operator Quits; Exchange May Close

Unless a new operator turns up in Kempton, Pa. for the Berks & Lehigh Telephone Company's switchboard pretty soon, that community (pop. 110) and several other nearby rural settlements are going to be cut off from telephonic communication.

Ira Schroeder, who operated the magneto switchboard for 12 years, sent in his resignation when the company refused to raise his pay. The resignation was to have been effective September 1.

Schroeder's refusal to stay forced the company's directors to offer the exchange, which serves 172 subscribers, for sale, lock, stock and barrel. The 50 stockholders of the company have approved its sale to Lewis Hyle, owner of the Lycoming Telephone Company, for $4,000.

Because the sale must first be approved by the Public Utilities Commission, the directors prevailed on Schroeder to continue for another month.

Schroeder, who has had the help of his wife and sister in keeping the 24 hour service going insists he won't continue after September 30, come what may.

Meanwhile, Hyle, the purchaser, has been scouring Kempton to find a new operator and a new switchboard location. The concern operates two trunk lines into the Bell Telephone System's Reading exchange for long-distance calls.

If the PUC approves the sale, the 45-year-old concern will be dissolved at the end of the year and its assets will be distributed among its stockholders. Dr. R. W. Fetherolf, of Steinsville, Lehigh county deputy coroner, is president of the company.

Telephone Engineer

HANDBOOK TABLES

Subject: ***Characteristics of Telephone Circuits***

Index—Transmission Data
Date—September 15, 1945

To properly terminate toll and long exchange lines at the central office, it is important to know certain characteristics of telephone circuits. The accompanying table gives information on the loop resistance, transmission loss, and characteristic impedance of cable and open wire circuits.

The loop resistance and the transmission loss characteristics are useful for testing purposes. A knowledge of the characteristic impedance of a telephone line enables the proper selection of repeating coils for matching the line to the office equipment. The characteristic impedance is the impedance of a line with uniform resistance, inductance, capacitance, and leakage throughout its length. It is most easily determined by measuring the input impedance of the line with the far end short-circuited and then with the far end open-circuited, and substituting the two values thus obtained in the equation: $Zo = \sqrt{Zsc \times Zoc}$ in which Zo is the characteristic impedance, Zsc the short-circuit impedance, and Zoc the open-circuit impedance. If the line is terminated in a repeating coil of the same input impedance as its characteristic impedance, maximum power transfer will be effected and reflection losses eliminated.

Short exchange lines are generally considered to have a characteristic impedance of 600 ohms.

Facility	Conductor	Loop Resistance Ohms per Mile at 68° F.	Characteristic Impedance Ohms at 1000 Cycles (approximate)	Transmission Loss per Mile in db
26 ga. non-loaded cable	Copper	440	1007	2.7
24 ga. " "	"	274	778	2.1
22 ga. " "	"	170	567	1.8
19 ga. " "	"	85	402	1.1
16 ga. " "	"	42	320	0.7
109 open wire (physical)	Iron	94	1570	0.28
104 open wire (physical)	Copper	10.2	730	0.062
104 " " (phantom)	"	5.1	403	0.057
128 " " (physical)	"	6.7	693	0.044
128 " " (phantom)	"	3.4	384	0.039
165 " " (physical)	"	4.1	653	0.028
165 " " (phantom)	"	2.1	366	0.026

Buckingham Announces "Fabuck"

Buckingham Manufacturing Company of Binghamton, New York, has developed a new product for its line of safety belts and straps because most of its available leather was absorbed in orders for the United States Armed Forces.

Fabuck won't length unduly, won't stretch narrower or thinner, and so sacrifice safety. Because of its high resistance to abrasion it wears "longer."

Buckingham Manufacturing Company expects soon to be in production of safety straps and belts made of the new material.

It is called Fabuck. In announcing Fabuck, Mr. Robert F. Stepbach, sales manager for Buckingham told safety engineers that Fabuck was first thought of as a substitute for leather. However, laboratory reports and mechanical tests soon proved that the Buckingham engineers had really hit on something worth developing.

After almost a year of carefully guarded laboratory work, Fabuck in the form of safety belts and straps, was sent out for testing in actual field work. Linemen of all sizes and weights, experienced men and novices, were equipped with Fabuck belts and safety straps and told to give them "the works." The new material came through with flying colors. It tested 6,300 lbs. to the square inch.

"Next we developed a rounded edge with the ends of the basic material folded completely inside the fabric. After that we put Fabuck to the severest abrasion tests our technicians could devise, and again it came through with better results than we had hoped for.

"We are confident that Fabuck, in safety strap and belt construction," said Mr. Stepbach, "affords a high factor of safety because of its tensile strength, a maximum of comfort because of its resiliency, a long life because of its neoprene impregnation.

Acquire Lot; Plan New Plant

The Southeast Missouri Telephone Company of Charleston, Mo., has purchased a lot from their county court on which to construct a building.

According to Charles W. Boutin, president of the company, an architect is now working on plans for a modern building. Plans, he said, also call for the installation of dial telephone equipment, and considerable underground cable, as soon as equipment and materials are made available.

PREMAX

Metal Pole Markers

Premax Stamped and Embossed Metal Pole Markers are again available for Public Utilities. These lifetime Pole Markers cut identification costs and save labor.

Premax Products

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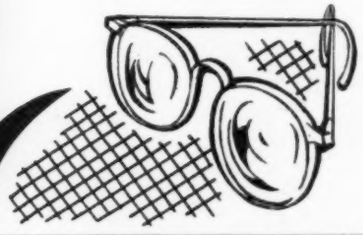
THE BEST GLASSES EVER MADE



. . . are not good enough to detect tension and sag to TODAY'S standards!

Be CERTAIN with a Dillon DYNAMOMETER

Quickly gives you exact readings. Takes out all guessing. SAVES TIME. Saves maintenance. Up-to-the-minute telephone men are using Dillon Dynamometers for guys, conductor, strand or high tension wire. Large easily read figures in pounds, instantly read. No charts. No figuring. Compact, easily carried. Nine capacities for 500 to 20,000 lbs., all same size.

Weight: 8 lbs., 4 oz. Size 8¼" x 6¼" x 3". Not injured by overload. Strong construction cased for all weathers

Write, write or phone for illustrated folder with full details.

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Former Navigator Bombardier is Kellogg Texas Representative

O. C. Bailey

After three years of aerial combat duty in various war theatres, Captain O. C. Bailey, a native Texan, has been appointed a field representative by the Kellogg Switchboard and Supply Company.

Among the awards Captain Bailey has received for outstanding service are the Distinguished Flying Cross; the Air Medal, with six Oak-Leaf Clusters; Distinguished Unit Citation, Asiatic-Pacific Theatre ribbon with India-Burma battle star, and the European-African-Middle Eastern theatre ribbon with four bronze battle stars.

Mr. Bailey, before entering military service, was active for several years in the Bell and Independent telephone field. His experience includes testing, diagnosing and repairing manual and dial switchboards.

As Kellogg field representative, Mr. Bailey will work out of Austin, Texas. on switchboard and apparatus problems.

Denies Approval of Sale

Because J. C. Steinhagen, who wished to purchase the Dodge Center (Minn.) Telephone Exchange from Pete Giesler, present owner, failed to file with the Minnesota Railroad and Warehouse Commission, within 30 days of the application to purchase, an estimate of the expenditures he proposed to make in restoring the property and an estimate of the date such work would be completed, together with an affidavit of his ability to finance the project, the commission denied approval of the sale and transfer of the exchange.

Telephone Hour Voted Tops In Its Radio Field

For the second successive year The Telephone Hour, sponsored by the Bell System, has been voted "best radio program by an orchestra with featured soloists" in the annual poll of music editors of the daily newspapers in the United States and Canada.

The choice was announced by "Musical America" which conducts the poll Donald Vorhees, conductor of The Telephone Hour, which is broadcast every Monday night, placed second to Frank Black, of NBC, as "best program conductor" in the same poll. Director Vorhees, who brought Fritz Kreisler to radio for the first time last winter, is joining the famous violinist in making two Victor albums and Kreisler has expressed a desire to record exclusively with him.

Petition to Sell Company

Mary S. Chambers and Aileen Sheldon, administratrices of the estate of Royal S. Chambers, have petitioned their state public service commission for consent to sell the Nicholville (N.Y.) Telephone Company to Mildred Matthews. The hearing was set for September 13.

Ohio Bell Promotions

John A. Greene, formerly vice-president and general manager of The Ohio Bell Telephone Company's northeastern area, has been named operating vice-president, according to Randolph Eide, the company's president.

Mr. Greene succeeds Franklin Stephens, who has been elected president of the Wisconsin Telephone Company.

John A. Greene

Leroy E. Lattin, of Cleveland, was elected vice-president and general manager of The Ohio Bell Telephone

Leroy E. Lattin

Company's northeastern area at a meeting of the company's board of directors in Cleveland.

Mr. Lattin succeeds John A. Greene.

Plastic Wire and Cable Receives "E" Pennant

The nation's highest award for excellence in the production of war materials, the Army and Navy "E" was presented to the employees of the Plastic Wire & Cable Corporation, Norwich, Connecticut recently. In the ceremony the corporation's record of producing wire just sixty-nine days after its formation was characterized as "nothing short of amazing."

New Company, Virginia Independent

The Tidewater Telephone Company, which was formed to take over and operate the properties in the Northern Neck of the East Coast Telephone Company, of Warsaw, Va., received its charter August 4 from the Virginia State Corporation Commission. Maximum capitalization to be $500,000.

Officers of the corporation are Senator R. O. Norris, Jr., of Lively, chairman of the board; Rodney M. Coggin of Warsaw, president and general manager; J. Marshall Lewis of Gloucester, vice president and Thomas H. Blanton of Bowling Green, secretary-treasurer.

Directors, in addition to the officers, are W. Collin Chilton, Kilmarnock; George P. DeHardit of Gloucester; James E. Gallaher of Richmond; George H. Hinton, Reedville, and Charles E. Stuart, Montross.

Increased Rates

The Effington Telephone Company, Parkers Prairie, Minn., received approval from its state commission to increase its rates 25c on both business and residence services, rates to be effective the first billing date following August 31. The increase in rural switching rates from 40c to 50c and the increase in business stations from $1 to $1.25 were denied because of insufficient supporting evidence.

New Mousing Tool Developed by Copperweld

An additional method for dead-ending Copperweld guy strand has been made possible by the development of a simple and inexpensive Mousing Tool, which, together with a coil of annealed Copperweld wire, enables the lineman to place about 50 closely wrapped turns around the free end of the strand and the main strand, thus binding them securely together. This type of dead-end will develop the full rated strength of the strand and is applicable for attaching the strand to the various guy fittings, such as eye bolts, strain insulators and anchor eyes. It provides an alternate method to serving the individual wires of the strand and to dead-ending with guy clamps.

The Copperweld Mousing Tool is similar to the Copperweld Serving Tool except for a slight difference in the forming of the tines at the ends of the tool and the additions of two small J hooks which are for maintaining tension on the mousing wire.

An instruction folder outlining the details will be mailed you by writing the Copperweld Steel Company Glassport, Pa.

Copperweld's new mousing tool which enables a lineman to securely bind together the free end of the strand and the main strand by means of a coil of annealed Copperweld wire.

Forged Bolt Connectors

Reliable Electric Company, Chicago, Illinois has made another forward step in the development of high quality connectors. Forged bolt connectors are now available in five sizes —for Nos. 9, 6, 4, 2 and 1 solid wire. They have the same high efficiency as the machined type and have a higher copper content. You will find them listed in Reliable's general price sheet GI. For further details, see their ad on page 32.

Applies for Rate Increase

The Audubon (Minn.) Telephone Company has filed an application for increased rates with the Minnesota Railroad and Warehouse Commission, and the hearing has been set for October 16. Audubon's present and proposed net monthly rates are as follows:

Class of Service	Present Net Rates	Proposed Net Rates
Individual Line Business	$1.75	$2.00
Two-party Line Business	1.50	1.75
Four-party Line Business	1.25	1.50
Individual Line Residence	1.25	1.50
Two-party line Residence	1.25	1.50
Four-party Line Residence	1.00	1.25
Rural Multi-party — company owned	1.00	1.25

Test-O-Lite

TESTS ANY VOLTAGE... 100 to 550 Volts, A.C. or D.C. Safely, Swiftly, Surely

THE NEON GLOW LOCATES TROUBLE INSTANTLY

Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb. Indispensable in shop or home. Has PATENTED safety features. Vest pocket size. Life time guarantee. List $1.50. Purchase thru electrical dealers.

RTC-2 VINCENT RARE GAS RELAY

for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

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You can rely on Pole line Hardware that bears the L-M trademark

✓ designed the way you want it
✓ built to last
✓ packed for convenience
✓ RIGHT in ALL WAYS

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are sturdily built for the hard usage of industrial service. Have plug type tips and are constructed on the unit system with each vital part, such as heating element, easily removable and replaceable. In 5 sizes, from 50 watts to 550 watts.

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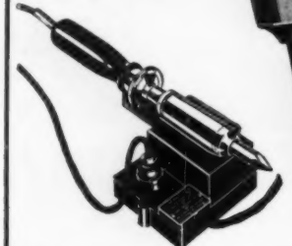
This is a thermostatically controlled device for the regulation of the temperature of an electric soldering iron. When placed on and connected to this stand, iron may be maintained at working temperature or through adjustment on bottom of stand at low or warm temperatures.



For further information or descriptive literature, write

107-1

AMERICAN ELECTRICAL HEATER COMPANY

DETROIT 2, MICH., U. S. A.

Auxiliary Signals and Devices For Added Income

(Continued from page 49)

of the handpiece fits contains a microphone to receive the sound from the receiver and the part into which the transmitter fits has a small loudspeaker to talk into the transmitter.

By means of automatic mechanism connected to a phonograph type pickup placed on the bell box, an amplifier is connected first to the speaking disc to record the incoming speech. The pickup will function only when the telephone bell rings and is not affected by bell taps.

The voice recording apparatus requires less investment and maintenance than the secretarial service. Although connection to an alternating current supply on the subscriber's premises is necessary, this unit requires only a small amount of power when in use and even less power while "idling" between calls.

Deaf Set Amplifiers

A USEFUL service that telephone companies can perform is to furnish deaf set amplifiers to their hard-of-hearing subscribers.

The equipment consists of a single stage amplifier with volume control box and batteries for the amplifiers. The subscriber adjusts the volume control to obtain the desired volume that will enable him to hear clearly when carrying on conversations on his telephone. The apparatus is so designed that no oscillation between the transmitter and receiver can result from the relatively high gain of the amplifier.

When a subscriber complains of poor hearing on his telephone and checks indicate that the telephone and line equipment are not at fault, tests may be conducted to determine whether a deaf set amplifier will be needed. The company may try various types of subsets of the side tone or antiside tone design or substitute the best available receiver for the one on the telephone instrument. If none of the changes satisfies the subscriber, the company may then recommend a deaf set amplifier and offer the loan of a portable set for trial. Then if good results are obtained and the subscriber is satisfied and willing to rent the permanent set, a regular deaf set amplifier may be installed. This procedure is necessary in order to satisfy the subscriber that the company is not trying to high pressure him into leasing what may seem to be an expensive and

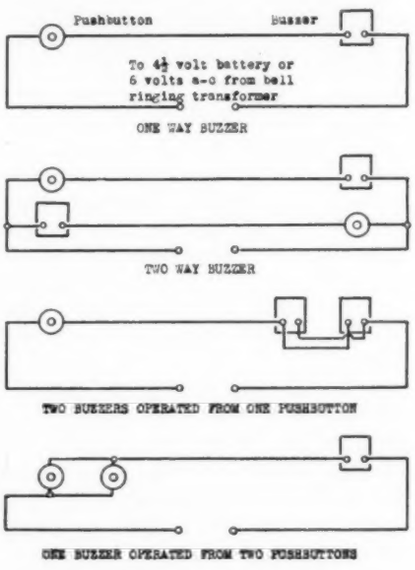

Pushbutton
Buzzer
To 4½ volt battery or 6 volts a-c from bell ringing transformer
ONE WAY BUZZER
TWO WAY BUZZER
TWO BUZZERS OPERATED FROM ONE PUSHBUTTON
ONE BUZZER OPERATED FROM TWO PUSHBUTTONS

Fig. 16—Buzzer circuit schemes.

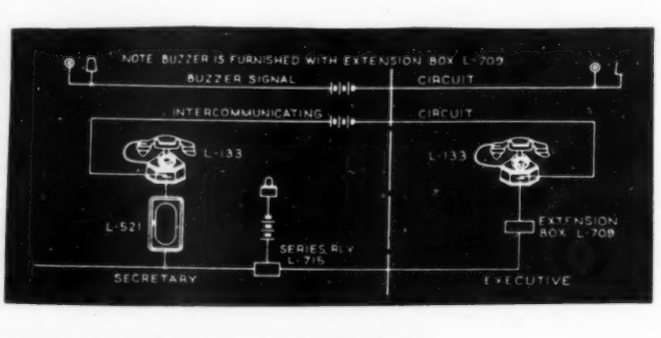


Fig. 15—Schematic diagram of Executive - Secretary Service with one central office line inter-communicating and buzzer circuit. (Courtesy Automatic Electric)

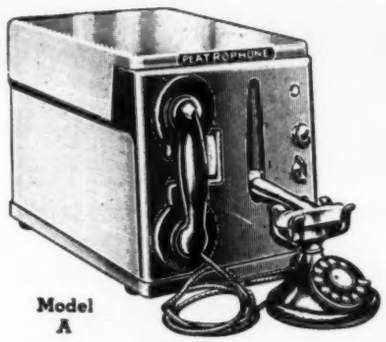


Fig. 17—Showing the appearance of the Peatrophone Voice Recording Unit.

unnecessary accessory to his telephone. Occasional cases may be found where the subscriber cannot be helped by a deaf set amplifier.

Conclusion

ONLY the more important types of special services that can be rendered to the subscriber have been listed. It is no less important, however, that the company owner or manager be alert to possibilities for other types of services that can be offered to subscribers. If a subscriber needs a certain type of service and seeks help from the telephone company, every effort should be made to give the subscriber the desired service if it is within the province of the telephone organization. The rate schedule filed with utility commissions should contain all types of services that the company is prepared to give and the rates that are to be charged for them.

The fact that the company is willing to provide any needed type of service for its subscribers will mark the management as progressive and alert to opportunity; it also insures the good will of the subscribers.

Plan Dial System

The 2,000 customers of the Platteville (Wisc.) Telephone Company will soon be reserviced with a dial telephone system which will replace the present battery system.

The Wisconsin public service commission authorized the Platteville Telephone Co., to issue a $50,000 note to secure funds to pay for automatic switchboard equipment. The commission last March authorized installation of the switchboard.

As soon as plans are completed, work will start on a new $25,000 exchange. According to the manager, Orrin Aiken, the company hopes to have the dial system in operation by the middle of next summer, depending upon when material can be obtained.

School in China

A Signal school, operating under the supervision of the U. S. Army's Chinese Training Center, to turn out Chinese Army communications specialists, has now been opened in Yunnan Province, according to word by Major General Ingles, the Chief Signal Officer. The commandant is Col. Willis M. Lansford, Signal Corps, of Bethesda, Maryland.

Buys Rural Lines

L. J. Ollig, Waverly, Minn., owner of the Estelline (S. D.) telephone system seems to be stepping up his properties in that part of the state. He has purchased the lines of the Brookings (S. D.) County Telephone Company, a rural organization serving some 440 subscribers in the country surrounding Aurora, Bushnell and Bruce. Calls will be serviced through the Brookings switchboard.

Besides his new investment, Mr. Ollig owns exchanges at White, Toronto, Estelline, Elkton, Dell Rapids, Irene, Blunt, and Highmore, S. D., as well as Lake Benton, Willmar, Waverly, and other Minnesota points.

According to plans the new owner is planning to rebuild all lines in the newly acquired property.

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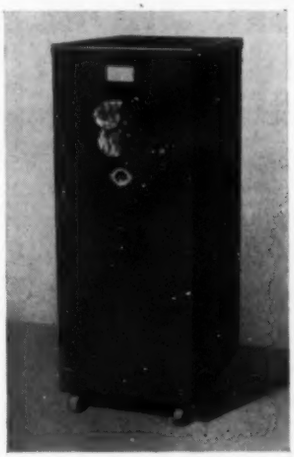

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POSITION WANTED: Man, age 32, with 8 years experience in testing of dial, C. B. manual and magneto Swbs. desires central office work on West Coast. Write Box 8399, c/o TELEPHONE ENGINEER.

FOR SALE: Magneto telephone exchange of 75 stations, possibilities good for more conveniently located in rich farming belt in north Texas. Recently rebuilt and in good working order. Two toll line connections with Southwestern Bell System. Good toll business. Good schools and churches. Address: E. C. Gann, owner, Tom Bean, Texas.

Classified Ads

WANTED: Plant Superintendent for large telephone property. Good salary for man having qualifications. In replying, furnish complete information as to age, education, experience, present employment, draft status, small photograph, recommendations, etc. Write Telephone Services, Inc., 16th Floor, Lincoln Tower, Fort Wayne 2, Ind.

WANTED — Combination Plant Man able to maintain both inside and outside plant of either Common Battery or Magneto exchange. Opportunity for permanent employment and good wages. Give age, experience, draft status and availability. Write Oklahoma Telephone Company, Broken Arrow, Oklahoma.

WANTED: Telephone men for our Chicago factory. Steady work now and after the war, good wages and working conditions. To rebuild: telephones, magneto switchboards and dial switchboards. Telephone Repair & Supply Co., 1760 Lunt Ave., Chicago, Tel. ROGers Pk. 3818.

WANTED: Assistant to General Manager for large telephone property. Must have executive ability and administrative experience. In application furnish information as to age, education, experience, present employment, draft status, small photograph, recommendations, etc. Write Box 8386, c/o TELEPHONE ENGINEER.

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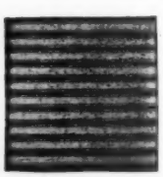

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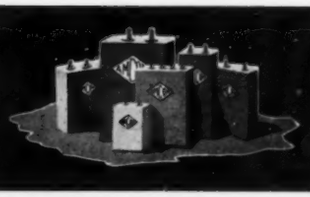

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The sheet is indexed for ready reference. Request your copy of price sheet GI today by mailing a postcard to Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Illinois.

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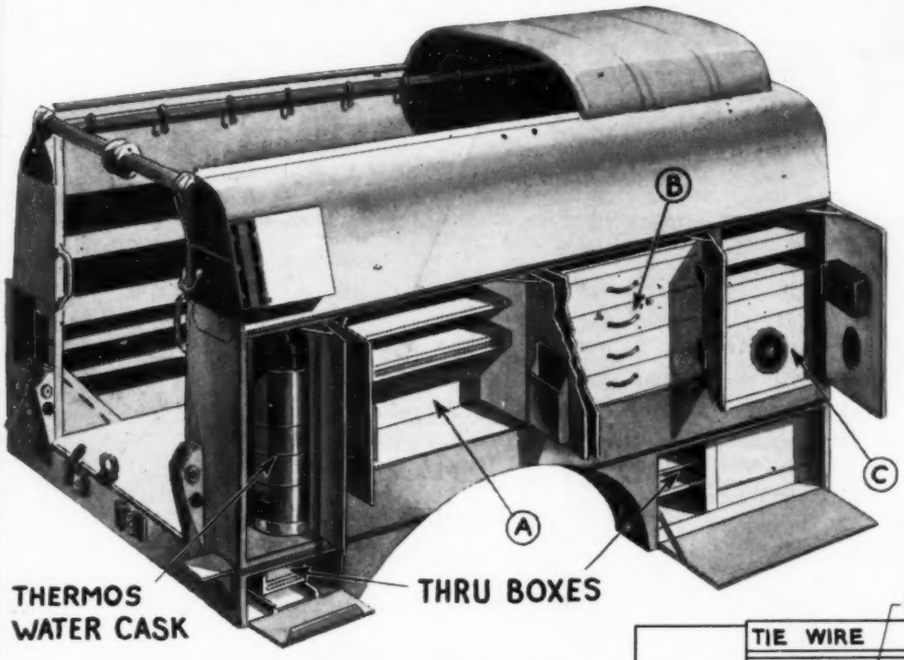

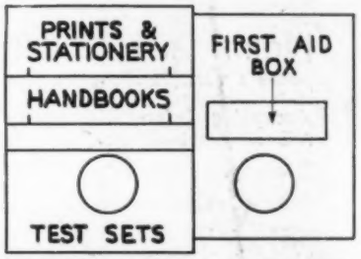

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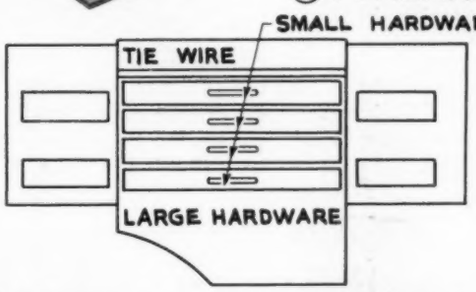

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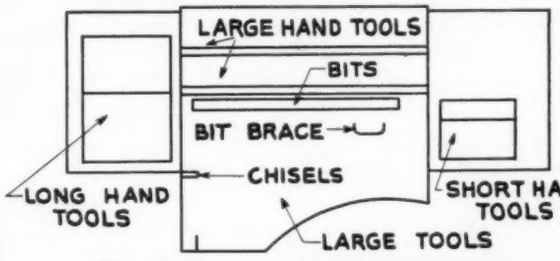

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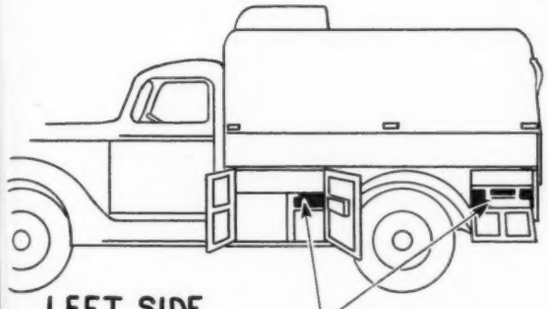

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The body, itself, is of all-metal construction, incorporating the latest engineering improvements, assuring exceptionally long life in actual service.

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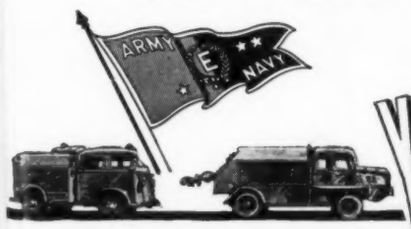

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NORTH Information Desks are designed primarily to answer information and intercepted calls. They possess various features, such as the following:

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Intercepting trunks or changed number service trunks.

Chief Operator's trunk for extension of calls where necessary.

Verification trunks to local subscribers' lines.

Two-way chief operator's trunk to the Information Desk.

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Special remote control keys and circuits as required.

North Information Desks provide glass covered panels for special instructions.

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Galion, Ohio

"ALL-RELAY" DIAL AUTOMATIC EQUIPMENT

Central Offices, 10 lines to 10,000 lines • Telephone Ins[illegible] Toll Boards [illegible] Toll Boards • PABX Attendantless • PABX Attendant • Toll Termination Equipment • Service Observation Equipment • Battery Chargers • Battery Racks • Power Boards • Main Distributing Frames • Chief Operators' Desks • Information Desks • Repair Clerks' Desks • Toll Test Panels • Wire Chiefs' Desks and Panels • Special Services Equipment